Nokia Customer Care

Service Manual

RM-70 (Nokia 7370)

Mobile Terminal

Part No: 9246003 (Issue 1)

COMPANY CONFIDENTIAL

NOKIA

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Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
Original issue	11/2005	J Bryman	

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IMPORTANT

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Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/ MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

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For your safety

QUALIFIED SERVICE

Only qualified personnel may install or repair phone equipment.

ACCESSORIES AND BATTERIES

Use only approved accessories and batteries. Do not connect incompatible products.

CONNECTING TO OTHER DEVICES

When connecting to any other device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

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Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

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ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

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Battery information

Note: A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMh batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

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Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing/e-mail.

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Please send to:

NOKIA CORPORATION

Nokia Mobile Phones Business Group

Nokia Customer Care

PO Box 86

FIN-24101 SALO

Finland

E-mail: Service.Manuals@nokia.com

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Nokia 7370 Service Manual Structure

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4 Service Tools and Service Concepts
5 Disassembly and reassembly instructions
6 BB Troubleshooting and Manual Tuning Guide
7 RF Troubleshooting and Manual Tuning Guide
8 System module
9 Schematics
Glossary

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1 — General information

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Product selection

The RM-70(Nokia 7370) is a triple band transceiver unit designed for the GSM900/1800/1900 networks, including EGSM.

Figure 1 RM-70 product picture

Key Features:

- 180-degree rotator design with ergonomic tilt
- EDGE tri-band phone
- 1.3-megapixel camera with full-screen landscape camera mode, 8x digital zoom, and dedicated key
- 2.0" display screen with 100% active area and up to 262,144 colors
- Take pictures in colour, black and white, and sepia
- Video ringing tones
- FM visual stereo radio with integrated 3D stereo speakers

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Features

Phone features

Display and keypad features

- 262 K colour QVGA 240 x 320 pixels display
- 5-way scroll key, 2 soft keys, send and end keys, Camera Key, Volume/Zoom key
- Dedicated key for landscape video camera mode

Hardware features

- Svivel phone
- 1.3-megapixel camera with full-screen landscape camera mode and 8x digital zoom
- Bluetooth
- PopPortTM™
- 2 mm charger plug interface
- FM radio
- MP3 player
- Internal vibrator
- Plug-in SIM (1.8 V and 3.0 V)
- Real time clock

RF features

- EDGE tri-band GSM 900/1800/1900
- EDGE*: Class B, multislot class 10
- GPRS: Class B, multislot class 10
- HSCSD

Software and User interface features

Software features

- ISA OS 8.0s Platform
- Nokia Series 40 User interface (UI): Java MIDP 2.0

UI features

Imaging	• Integrated 1.3-megapixel camera with full-screen landscape camera mode, with up to 8x digital zoom • Black and white, sepia, negative, and multi-shot modes • Use saved pictures as screensavers • Video recorder and player • Supported image formats: JPEG, GIF, WBMP, BMP, PNG • MPEG video playback and streaming

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Multimedia	• Visual Radio: Listen to music and interact with your favorite radio stations - Find out what song is playing, who sings it, and other artist information - Enter contests and answer surveys, vote for your favorite songs - Download the songs you buy direct to your phone • Digital music supported for the following media type: MP3, AMR, MIDI • Video playback formats: H.263 video, MPEG-4 • FM stereo radio with integrated 3D stereo speakers • Integrated music player for MP3/AAC/M4A formats
Memory functions	• 10 MB built-in memory
Messaging	• Multimedia messaging: MMS for creating, receiving, editing, and sending videos and pictures with AMR voice clips • Email: Supports SMTP, POP3, IMAP4, and APOP protocols. Support for attachments (view jpeg, 3gp, MP3, .ppt, .doc, .xls, and .pdf files) • Text messaging: Supports concatenated SMS, picture messaging, SMS distribution list • Presence-enhanced contacts: Check the status of your friends before you call them • Support adding attachments up to 100 kB and for receiving up to 50 kB
Games	• Phantom Spider Evolution
Applications	• Java™ MIDP 2.0 • Visual Radio, world clock, size converter, converter, email 3, translator
Ringing tones	• Supported file formats: Video ringing tones, MP3, AAC, 64-chord/voice polyphonic MIDI ringing tones
Connectivity	• Pop-Port™ interface to USB • Bluetooth • Remote over-the-air (OTA) synchronization with SyncML • Local synchronization with PC using PC Suite
Browsing	• WAP* 2.0 xHTML/HTML multimode browser • OMA Digital DRM 1.0 - including forward lock for content protection, combined delivery, separate delivery and superdistribution
Data transfer	• EDGE: Class B, multislot class 10 • GPRS: Class B, multislot class 10 • HSCSD (high-speed circuit-switched data)
Voice features	• Voice dialing • Voice recorder • Integrated handsfree speaker
Digital services	• Video streaming services • Exclusive UI themes

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Accessories

Table 1 Battery and chargers

Type	Name
Note: This phone is charged through the smaller Nokia standard interface (2.0 mm plug). The 3.5 mm standard charger can be used together with the CA-44 charger adapter.	
AC-3	Compact charger
AC-4	Travel performance charger
BL-4B	Battery 700 mAh Li-Ion
CA-44	Charger adapter (from 3.5 mm -> 2 mm)

Table 2 Car accessories

Type	Name
CK-1W	Wireless car kit
DC-4	Mobile charger
HF-6W	Wireless plug-in handsfree
N616	Car kit

Table 3 Audio

Type	Name
HDA-10	Phone adapter
HDW-3	Wireless headset
HS-11W	Wireless headset
HS-23	Stereo headset
HS-3	Stereo headset: fashion
HS-31	Fashion stereo headset
HS-4W	Wireless boom headset
LPS-4	Loopset
MD-1	Music stand
HS-6	Display headset

Table 4 Connectivity

Type	Name
CA-53	USB cable

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Table 5 Imaging and lifestyle

Type	Name
PT-6	Remote camera

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2 — Parts and layouts

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Exploded view

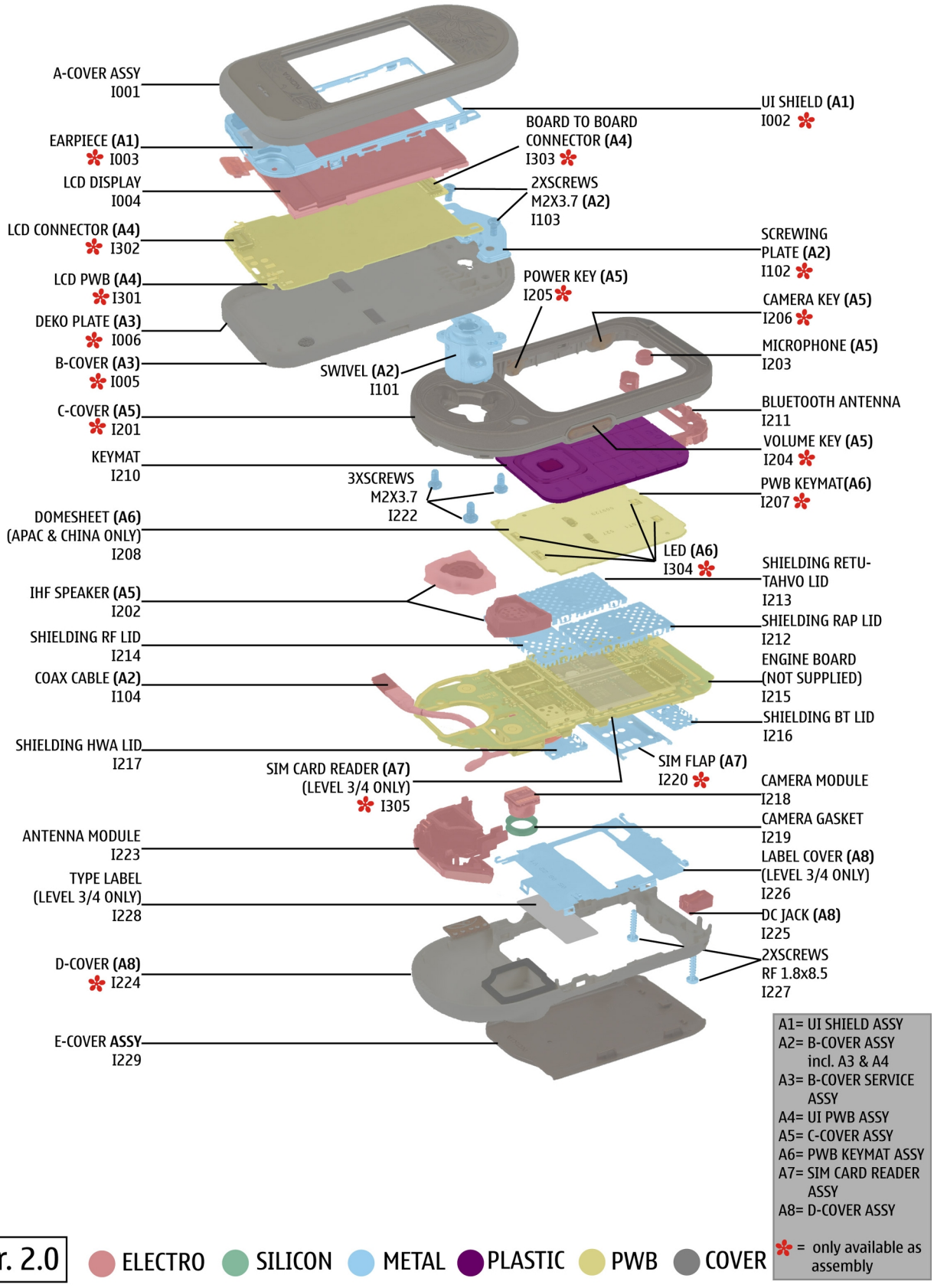

Figure 2 Exploded view

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Spare parts overview

Figure 3 Spare parts overview

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Mechanical parts list

Table 6 Mechanical parts list

ITEM	QTY	PART NAME
** = Not available as spare part*		
I001	1	A-COVER ASSY
A1	1	UI-SHIELD ASSY
I002*	1	UI SHIELD
I003*	1	EARPIECE
I004	1	LCD DISPLAY
A2	1	B-COVER ASSY
A3	1	B-COVER SERVICE ASSY (I005 & I006)
I005*	1	B-COVER
I006*	1	DEKO-PLATE
I101	1	SWIVEL
I102*	1	SCREWING PLATE
I103	2	SCREWS M2 x 3.7
I104	1	COAX CABLE
A4	1	LCD PWB ASSY (I301 - I303)
I301*	1	LCD PWB
I302*	1	LCD CONNECTOR
I303*	1	BOARD TO BOARD CONNECTOR
A5	1	C-COVER ASSY
I201*	1	C-COVER
I202	2	IHF SPEAKER
I203	1	MICROPHONE
I204*	1	VOLUME KEY
I205*	1	POWER KEY
I206*	1	CAMERA KEY
A6	1	PWB KEYMAT ASSY
I207*	1	PWB KEYMAT
I208	1	DOMESHEET (APAC & CHINA only)
I304*	4	LED
I210	1	KEYMAT

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ITEM	QTY	PART NAME
I211	1	BLUETOOTH ANTENNA
I212	1	SHIELDING RAP LID
I213	1	SHIELDING RETU-TAHVO LID
I214	1	SHIELDING RF LID
I215*	1	ENGINE BOARD
I216	1	SHIELDING BT LID
I217	1	SHIELDING HWA LID
I218	1	CAMERA MODULE
I219	1	CAMERA GASKET
A7	1	SIM CARD READER ASSY
I220*	1	SIM FLAP
I305*	1	SIM CARD READER
I222	3	SCREWS M2 x 3.7
I223	1	ANTENNA MODULE
A8	1	D-COVER ASSY
I224*	1	D-COVER
I225	1	DC JACK
I226	1	LABEL COVER
I227	2	SCREWS RF 1.8 x 8.5
I228	1	TYPE LABEL
I229	1	E-COVER

Swap phones

Table 7 Swap phones

Region	Colour
E&A	Warm Amber
E&A	Coffee Brown
FR	Warm Amber
FR	Coffee Brown
RU	Warm Amber
RU	Coffee Brown
SA	Warm Amber
SA	Coffee Brown
TR	Warm Amber

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Region	Colour
TR	Coffee Brown
UA	Warm Amber
UA	Coffee Brown

Component parts list

Table 8 Component parts list (PWB 1lua_50a)

Item	Name	PWB side	X	Y	Value
A2400	RETU-TAHVO ASSEMBLY 040-009341 P2465	Top	L	7	~
A2800	RAP ASSEMBLY 040-009340 P2465	Top	L	3	~
A3300	HWA ASSEMBLY 040-009339 P2465	Bottom	H	4	~
A6150	BT ASSEMBLY 040-009338 P2465	Bottom	O	4	~
A7000	RF ASSEMBLY 040-009342 P2465	Top	H	5	~
B2200	CRYSTAL 32.768KHZ +-20PPM 12.5PF	Top	N	7	32.768kHz
C2000	Chipcap 5% NP0	Bottom	P	4	27p
C2001	Chipcap X7R 10% 50V 0402	Bottom	P	4	1n0
C2002	CHIPCAP X5R 2U2 K 6V3 0603	Top	P	6	2u2
C2003	CHIPCAP X7R 33N K 10V 0402	Top	P	6	33n
C2004	CHIPCAP X7R 33N K 10V 0402	Top	P	6	33n
C2005	Chipcap X7R 10% 16V 0402	Top	P	6	10n
C2006	Chipcap X7R 10% 16V 0402	Top	P	6	10n
C2007	Chipcap X7R 10% 16V 0402	Top	P	7	10n
C2008	Chipcap X7R 10% 16V 0402	Top	P	7	10n
C2009	Chipcap X7R 10% 16V 0402	Top	P	7	10n
C2010	Chipcap X7R 10% 16V 0402	Top	P	7	10n
C2011	Chipcap 5% NP0	Top	P	7	10p
C2012	Chipcap 5% NP0	Top	P	7	10p
C2013	Chipcap 5% NP0	Top	P	7	10p
C2014	Chipcap 5% NP0	Top	P	7	10p
C2015	CHIPCAP X5R 100N K 10V 0402	Top	P	6	100n
C2016	CHIPCAP NP0 270P J 25V 0402	Bottom	P	5	270p
C2017	CHIPCAP X5R 470N K 25V 0603	Bottom	Q	4	470n
C2018	Chipcap X7R 10% 16V 0402	Bottom	P	5	10n
C2019	Chipcap X7R 10% 16V 0402	Bottom	P	6	10n
C2020	Chipcap X7R 10% 16V 0402	Top	O	8	10n
C2070	CHIPTCAP 150U M 10V 6X3.2X1.5	Bottom	E	8	150u_10V

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Item	Name	PWB side	X	Y	Value
C2071	Chipcap 5% NP0	Bottom	H	7	27p
C2072	Chipcap 5% NP0	Top	O	6	27p
C2073	CHIPCAP X5R 1U K 6V3 0603	Bottom	H	8	1u0
C2074	Chipcap X7R 10% 16V 0402	Bottom	G	8	10n
C2075	CHIPCAP X5R 1U K 6V3 0603	Bottom	H	7	1u0
C2076	Chipcap X7R 10% 16V 0402	Bottom	H	7	10n
C2077	Chipcap X7R 10% 16V 0402	Bottom	H	6	10n
C2078	Chipcap 5% NP0	Bottom	E	8	27p
C2079	Chipcap 5% NP0	Bottom	H	8	27p
C2100	CHIPCAP X7R 33N K 10V 0402	Top	P	8	33n
C2101	CHIPCAP X7R 33N K 10V 0402	Top	P	7	33n
C2102	CHIPCAP X5R 2U2 K 6V3 0603	Top	P	8	2u2
C2103	Chipcap X7R 10% 50V 0402	Top	O	7	1n0
C2104	Chipcap X7R 10% 50V 0402	Top	O	7	1n0
C2105	Chipcap 5% NP0	Bottom	H	6	27p
C2106	Chipcap 5% NP0	Bottom	G	6	27p
C2107	Chipcap 5% NP0	Top	G	8	27p
C2108	Chipcap X7R 10% 50V 0402	Bottom	K	9	1n0
C2109	Chipcap X7R 10% 50V 0402	Bottom	K	9	1n0
C2110	Chipcap X7R 10% 50V 0402	Bottom	K	9	1n0
C2111	Chipcap 5% NP0	Top	F	5	27p
C2112	Chipcap X7R 10% 50V 0402	Bottom	K	8	1n0
C2113	Chipcap X7R 10% 50V 0402	Bottom	K	9	1n0
C2114	Chipcap X7R 10% 50V 0402	Bottom	K	9	1n0
C2117	CHIPCAP X5R 100N K 10V 0402	Bottom	N	9	100n
C2118	CHIPCAP X5R 100N K 10V 0402	Bottom	M	9	100n
C2119	CHIPCAP X5R 100N K 10V 0402	Bottom	N	9	100n
C2120	CHIPCAP X5R 100N K 10V 0402	Bottom	N	9	100n
C2124	CHIPCAP X5R 100N K 10V 0402	Bottom	L	9	100n
C2126	CHIPCAP X5R 10U M 6V3 0805	Bottom	L	9	10U
C2127	CHIPCAP X5R 1U K 6V3 0603	Bottom	M	9	1u0
C2200	CHIPCAP X5R 1U K 6V3 0603	Top	M	6	1u0
C2201	CHIPCAP X5R 1U K 6V3 0603	Top	M	8	1u0
C2202	Chipcap X7R 10% 50V 0402	Top	N	9	1n0
C2203	Chipcap X7R 10% 50V 0402	Top	N	7	1n0

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Item	Name	PWB side	X	Y	Value
C2204	Chipcap X7R 10% 50V 0402	Top	N	7	1n0
C2205	Chipcap X7R 10% 50V 0402	Top	N	6	1n0
C2206	Chipcap X7R 10% 50V 0402	Top	N	7	1n0
C2207	Chipcap X7R 10% 50V 0402	Top	N	8	1n0
C2208	Chipcap 5% NP0	Top	N	7	27p
C2209	Chipcap 5% NP0	Top	N	7	22p
C2210	CHIPCAP X5R 1U K 16V 0603	Top	L	8	1u0
C2211	CHIPCAP X5R 4U7 K 10V 0805	Top	L	8	4u7
C2212	CHIPCAP X5R 1U5 K 4V 0402	Top	L	7	1u5
C2213	CHIPCAP X5R 1U5 K 4V 0402	Top	M	8	1u5
C2214	CHIPCAP X5R 1U5 K 4V 0402	Top	M	8	1u5
C2215	CHIPCAP X5R 1U5 K 4V 0402	Top	M	8	1u5
C2216	CHIPCAP X5R 1U5 K 4V 0402	Top	L	8	1u5
C2217	CHIPCAP X5R 1U5 K 4V 0402	Top	N	8	1u5
C2218	Chipcap X7R 10% 50V 0402	Top	N	7	1n0
C2219	CHIPCAP X5R 1U5 K 4V 0402	Top	N	8	1u5
C2220	CHIPCAP X5R 1U5 K 4V 0402	Top	L	7	1u5
C2221	CHIPCAP X5R 1U K 6V3 0603	Top	L	9	1u0
C2222	CHIPCAP X5R 1U K 6V3 0603	Top	L	8	1u0
C2223	Chipcap X7R 10% 16V 0402	Top	L	6	10n
C2224	Chipcap X7R 10% 16V 0402	Top	N	6	10n
C2225	CHIPCAP X5R 1U K 6V3 0603	Top	N	8	1u0
C2226	CHIPCAP X5R 1U K 6V3 0603	Top	M	8	1u0
C2227	CHIPCAP X5R 1U K 6V3 0603	Top	L	7	1u0
C2228	CHIPCAP X5R 1U K 6V3 0603	Top	M	8	1u0
C2229	Chipcap X7R 10% 50V 0402	Top	L	7	1n0
C2230	CHIPCAP X5R 1U K 6V3 0603	Top	N	8	1u0
C2231	CHIPCAP X5R 10U M 6V3 0805	Top	L	6	10U
C2232	CHIPCAP X5R 1U K 6V3 0603	Top	L	8	1u0
C2273	Chipcap X7R 10% 50V 0402	Top	L	6	1n0
C2274	Chipcap X7R 10% 50V 0402	Top	L	7	1n0
C2275	Chipcap X7R 10% 50V 0402	Top	L	6	1n0
C2281	CHIPCAP X5R 1U K 6V3 0603	Top	M	8	1u0
C2300	Chipcap X7R 10% 16V 0402	Top	J	6	10n
C2301	CHIPCAP X5R 22U M 6V3 0805	Top	J	6	22u

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Item	Name	PWB side	X	Y	Value
C2302	CHIPCAP X5R 22U M 6V3 0805	Top	L	6	22u
C2303	CHIPCAP X5R 1U K 6V3 0603	Top	J	8	1u0
C2304	Chipcap X7R 10% 16V 0402	Top	L	7	10n
C2305	CHIPCAP X5R 1U K 6V3 0603	Top	J	9	1u0
C2306	CHIPCAP X5R 1U K 6V3 0603	Top	I	9	1u0
C2307	CHIPCAP X5R 1U K 6V3 0603	Top	J	7	1u0
C2309	CHIPCAP X5R 22U M 6V3 0805	Top	J	6	22u
C2312	CHIPCAP X5R 1U K 6V3 0603	Top	J	7	1u0
C2313	CHIPCAP X5R 1U K 6V3 0603	Top	J	7	1u0
C2314	CHIPCAP X5R 4U7 K 25V 0805	Top	K	8	4u7
C2315	CHIPCAP X5R 4U7 K 25V 0805	Top	K	9	4u7
C2400	Chipcap 5% NP0	Bottom	K	7	22p
C2401	Chipcap 5% NP0	Bottom	J	7	22p
C2402	Chipcap 5% NP0	Top	P	5	27p
C2403	Chipcap 5% NP0	Bottom	J	8	47p
C2404	Chipcap X7R 10% 25V 0402	Bottom	I	7	4n7
C2405	CHIPCAP X5R 100N K 10V 0402	Bottom	I	7	100n
C2406	CHIPCAP X5R 100N K 10V 0402	Bottom	I	7	100n
C2407	CHIPCAP X5R 100N K 10V 0402	Bottom	I	7	100n
C2408	Chipcap 5% NP0	Bottom	H	7	27p
C2409	Chipcap X7R 10% 25V 0402	Top	Q	3	4n7
C2410	CHIPCAP X5R 100N K 10V 0402	Top	Q	4	100n
C2413	Chipcap 5% NP0	Bottom	H	6	27p
C2414	Chipcap 5% NP0	Bottom	I	7	27p
C2415	Chipcap 5% NP0	Top	Q	4	27p
C2416	Chipcap 5% NP0	Top	Q	5	27p
C2418	Chipcap 5% NP0	Bottom	K	3	22p
C2419	Chipcap 5% NP0	Bottom	J	3	22p
C2420	CHIP ARRAY C0G 4X22P K 16V 0612	Bottom	J	4	4x22p
C2700	CHIPCAP X5R 100N K 10V 0402	Bottom	L	2	100n
C2701	Chipcap 5% NP0	Bottom	L	2	27p
C2800	CHIPCAP X5R 100N M 16V 0402	Top	L	5	100n
C2801	CHIPCAP X5R 100N M 16V 0402	Top	J	4	100n
C2802	CHIPCAP X5R 100N M 16V 0402	Top	K	5	100n
C2803	CHIPCAP X5R 100N M 16V 0402	Top	L	5	100n

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Item	Name	PWB side	X	Y	Value
C2804	CHIPCAP X5R 100N M 16V 0402	Top	J	5	100n
C2805	CHIPCAP X5R 100N M 16V 0402	Top	M	2	100n
C2807	CHIPCAP X5R 1U K 6V3 0603	Top	J	5	1u0
C2808	CHIPCAP X5R 100N M 16V 0402	Top	J	5	100n
C2809	CHIPCAP X5R 100N M 16V 0402	Top	K	5	100n
C2810	CHIPCAP X5R 100N M 16V 0402	Top	L	5	100n
C2811	CHIPCAP X5R 100N M 16V 0402	Top	M	2	100n
C2812	CHIPCAP X5R 100N M 16V 0402	Top	K	5	100n
C2813	CHIPCAP X5R 100N M 16V 0402	Top	J	2	100n
C2814	CHIPCAP X5R 100N M 16V 0402	Top	J	5	100n
C2815	CHIPCAP X5R 100N M 16V 0402	Top	L	5	100n
C2816	Chipcap 5% NP0	Top	M	5	27p
C2818	CHIPCAP X5R 100N M 16V 0402	Top	M	3	100n
C2819	CHIPCAP X5R 100N M 16V 0402	Top	M	4	100n
C2820	CHIPCAP X5R 100N M 16V 0402	Top	J	3	100n
C2821	Chipcap 5% NP0	Top	J	3	27p
C2830	Chipcap X7R 10% 50V 0402	Top	J	4	1n0
C2831	Chipcap +-0.25pF NP0	Top	J	4	4p7
C3000	CHIPCAP X5R 100N M 16V 0402	Top	N	2	100n
C3001	Chipcap X7R 10% 16V 0402	Top	N	2	10n
C3002	CHIPCAP X5R 100N M 16V 0402	Top	N	2	100n
C3003	Chipcap X7R 10% 16V 0402	Top	M	5	10n
C3004	CHIPCAP X5R 100N M 16V 0402	Top	M	5	100n
C3005	CHIPCAP X5R 100N M 16V 0402	Top	N	5	100n
C3006	CHIPCAP X5R 100N M 16V 0402	Top	N	5	100n
C3007	Chipcap X7R 10% 16V 0402	Top	N	5	10n
C3008	CHIPCAP X5R 100N M 16V 0402	Top	M	5	100n
C3009	CHIPCAP X5R 100N M 16V 0402	Top	N	5	100n
C3100	Chipcap 5% NP0	Bottom	K	6	27p
C3300	CHIPCAP X5R 100N K 10V 0402	Bottom	I	4	100n
C3301	CHIPCAP X5R 100N K 10V 0402	Bottom	H	4	100n
C3302	Chipcap X5R 10% 6.3V 0402	Bottom	G	4	220n
C3303	CHIPCAP X5R 100N K 10V 0402	Bottom	I	4	100n
C3304	Chipcap X7R 10% 16V 0402	Bottom	I	4	10n
C3305	CHIPCAP X5R 4U7 K 6V3 0603	Bottom	I	4	4u7

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Item	Name	PWB side	X	Y	Value
C3306	CHIPCAP X5R 4U7 K 6V3 0603	Bottom	I	4	4u7
C3307	CHIPCAP X5R 10UF 6V3 0603	Bottom	I	4	10u
C3308	CHIPCAP X5R 1U K 6V3 0402	Bottom	H	4	1u0
C3309	Chipcap 5% NP0	Bottom	H	4	27p
C3310	Chipcap 5% NP0	Bottom	I	4	27p
C6001	Chipcap +-0.25pF NP0	Top	P	3	4p7
C6002	CHIPCAP NP0 0P5 C 50V 0402	Top	P	3	0p5
C6010	Chipcap 5% NP0	Bottom	M	2	22p
C6011	Chipcap X7R 10% 16V 0402	Bottom	L	2	10n
C6012	Chipcap X7R 10% 16V 0402	Bottom	M	2	10n
C6031	Chipcap 5% NP0	Bottom	O	2	18p
C6032	Chipcap 5% NP0	Bottom	P	4	100p
C6033	Chipcap X7R 10% 16V 0402	Bottom	P	3	10n
C6034	Chipcap X7R 10% 16V 0402	Bottom	P	3	10n
C6035	Chipcap X7R 10% 16V 0402	Bottom	O	3	10n
C6036	Chipcap X7R 10% 16V 0402	Bottom	O	4	10n
C6037	CHIPCAP X5R 1U K 6V3 0402	Bottom	O	4	1u0
C6039	Chipcap 5% NP0	Bottom	P	3	18p
C6040	CHIPCAP X5R 1U K 6V3 0402	Bottom	O	4	1u0
C6041	CHIPCAP X5R 1U K 6V3 0603	Bottom	P	3	1u0
C6042	Chipcap X7R 10% 16V 0402	Bottom	O	3	10n
C6051	Chipcap +-0.25pF NP0	Bottom	O	3	2p7
C6052	Chipcap +-0.25pF NP0	Bottom	P	3	2p7
C6157	Chipcap X7R 10% 16V 0402	Bottom	O	6	10n
C6158	CHIPCAP X5R 100N K 10V 0402	Bottom	O	6	100n
C6159	CHIPCAP X7R 33N K 10V 0402	Bottom	O	4	33n
C6162	CHIPCAP X7R 33N K 10V 0402	Bottom	O	6	33n
C6163	CHIPCAP X7R 33N K 10V 0402	Bottom	P	5	33n
C6164	CHIPCAP X5R 100N K 10V 0402	Bottom	O	5	100n
C6165	CHIPCAP X7R 33N K 10V 0402	Bottom	O	4	33n
C6167	Chipcap X7R 10% 16V 0402	Bottom	P	5	10n
C6170	Chipcap X7R 10% 16V 0402	Bottom	P	5	10n
C6176	Chipcap 5% NP0	Bottom	P	4	100p
C6178	Chipcap 5% NP0	Bottom	P	5	27p
C6179	Chipcap 5% NP0	Bottom	P	5	47p

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Item	Name	PWB side	X	Y	Value
C6188	CHIPCAP X5R 100N K 10V 0402	Bottom	O	4	100n
C6189	CHIPCAP X5R 100N K 10V 0402	Bottom	O	4	100n
C6190	CHIPCAP X5R 100N K 10V 0402	Bottom	O	6	100n
C6191	CHIPCAP X5R 100N K 10V 0402	Bottom	O	6	100n
C7501	Chipcap +-0.25pF NP0	Top	G	4	2p7
C7502	CHIPCAP NP0 0P5 C 50V 0402	Top	I	4	0p5
C7503	CHIPCAP X5R 1U K 6V3 0603	Top	I	3	1u0
C7504	CHIPCAP X5R 1U K 6V3 0603	Top	G	4	1u0
C7505	CHIPCAP X5R 1U K 6V3 0402	Top	H	3	1u0
C7506	CHIPCAP X5R 1U K 6V3 0603	Top	I	3	1u0
C7507	Chipcap X7R 10% 16V 0402	Top	I	3	10n
C7508	Chipcap 5% NP0	Top	I	4	18p
C7509	Chipcap +-0.25pF NP0	Top	H	3	2p7
C7511	CHIPCAP NP0 2N2 G 16V 0603	Top	H	3	2n2
C7513	Chipcap X7R 10% 16V 0402	Top	I	3	10n
C7515	Chipcap +-0.25pF NP0	Top	G	3	4p7
C7516	Chipcap 5% X7R	Top	H	3	470p
C7518	CHIPCAP X5R 100N K 10V 0402	Top	I	4	100n
C7520	Chipcap +-0.25pF NP0	Top	G	7	3p3
C7521	Chipcap +-0.25pF NP0	Top	G	7	1p5
C7522	Chipcap +-0.25pF NP0	Top	I	7	1p8
C7523	CHIPCAP X5R 1U K 6V3 0402	Top	G	7	1u0
C7524	CHIPCAP X5R 1U K 6V3 0402	Top	I	6	1u0
C7525	Chipcap 5% NP0	Top	I	8	18p
C7560	Chipcap +-0.25pF NP0	Top	H	2	1p2
D2200	RETU 3.02 TSA1GJWE TFBGA108	Top	M	7	~
D2800	RAPGSM V1.1 PA uBGA289	Top	K	3	~
D3000	COMBO 256M NOR + 128M SDRAM FBGA133	Top	N	3	256MNOR +128MSDRAM
D3300	HW ACCELERATOR STV0984N	Bottom	H	4	~
F2000	SM FUSE F 2.0A 32V	Bottom	P	3	2A
G2200	RTC BACUP CAPAC 311 SIZE FOR 2.6V 4UAH	Top	O	6	2.6V
G7500	VCO 3296-3980MHZ 4-BAND MATSUSHITA	Top	G	3	3296-3980MHz
G7501	VCTCXO 38.4MHZ 2.5V 2MA	Top	I	2	38.4MHz

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Item	Name	PWB side	X	Y	Value
L2000	FERR.BEAD 220R/100M 2A 0R05 0603	Bottom	P	3	220R/ 100MHz
L2001	CHIP BEAD ARRAY 2X1000R 0405	Bottom	Q	6	2x1000R/ 100MHz
L2002	CHIP BEAD ARRAY 2X1000R 0405	Bottom	Q	7	2x1000R/ 100MHz
L2003	CHIP BEAD ARRAY 2X1000R 0405	Bottom	Q	7	2x1000R/ 100MHz
L2004	CHIP COIL 68NH J Q12/100MHZ 0603	Top	Q	6	68nH
L2100	CHIP BEAD ARRAY 2X1000R 0405	Bottom	K	6	2x1000R/ 100MHz
L2102	CHIP COIL 56N J Q38/200MHZ 0603	Top	F	6	56nH
L2103	CHIP COIL 56N J Q38/200MHZ 0603	Top	F	5	56nH
L2104	FERR.BEAD 220R/100M 2A 0R05 0603	Bottom	K	9	220R/ 100MHz
L2105	FERR.BEAD 220R/100M 2A 0R05 0603	Bottom	K	9	220R/ 100MHz
L2106	FERR.BEAD 220R/100M 2A 0R05 0603	Bottom	L	9	220R/ 100MHz
L2107	FERR.BEAD 220R/100M 2A 0R05 0603	Bottom	L	8	220R/ 100MHz
L2108	CHIP COIL 56N J Q38/200MHZ 0603	Top	G	8	56nH
L2109	CHIP COIL 56N J Q38/200MHZ 0603	Top	G	9	56nH
L2111	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	L	9	600R/ 100MHz
L2112	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	G	6	600R/ 100MHz
L2113	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	G	6	600R/ 100MHz
L2202	FERR.BEAD 220R/100M 2A 0R05 0603	Top	M	9	220R/ 100MHz
L2203	FERRITE BEAD 0.6R 600R/100MHZ 0402	Top	M	9	600R/ 100MHz
L2204	FERRITE BEAD 0.6R 600R/100MHZ 0402	Top	N	8	600R/ 100MHz
L2205	FERR.BEAD 220R/100M 2A 0R05 0603	Top	N	9	220R/ 100MHz
L2206	FERRITE BEAD 0.6R 600R/100MHZ 0402	Top	M	8	600R/ 100MHz

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Item	Name	PWB side	X	Y	Value
L2272	FERR.BEAD 220R/100M 2A 0R05 0603	Top	L	7	220R/ 100MHz
L2273	FERR.BEAD 220R/100M 2A 0R05 0603	Top	L	6	220R/ 100MHz
L2301	FERR.BEAD 220R/100M 2A 0R05 0603	Top	J	6	220R/ 100MHz
L2302	INDUCT WW 10UH 0A65 0R35 4X4X1.2	Top	K	6	10uH
L2304	CHOKE 22U M 0R7 0.35A 3.0x3.0x1.5	Top	J	8	22uH
L2305	FERRITE BEAD 0R5 600R/100MHZ 0603	Top	J	8	600R/ 100MHz
L2306	FERRITE BEAD 0R5 600R/100MHZ 0603	Top	I	8	600R/ 100MHz
L2400	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	H	6	600R/ 100MHz
L2401	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	H	6	600R/ 100MHz
L2402	FERR.BEAD 240R7100M 0.4A 0R4 0402	Top	Q	4	240R/ 100MHz
L2403	FERR.BEAD 240R7100M 0.4A 0R4 0402	Top	Q	5	240R/ 100MHz
L2404	FERR.BEAD 240R7100M 0.4A 0R4 0402	Top	O	5	240R/ 100MHz
L3301	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	H	4	600R/ 100MHz
L3303	INDUCT WW 2.2UH 1A2 310 CASE SIZE	Bottom	I	3	2u2H
L6030	CHIP COIL 2N7+-0N3 Q29/800M 0402	Bottom	O	3	2n7H
L6031	CHIP COIL 2N7+-0N3 Q29/800M 0402	Bottom	O	3	2n7H
L6032	CHIP COIL 22N J Q28/800M 0402	Bottom	O	3	22nH
L6156	CHIP COIL 47N G Q38/200MHZ 0603	Bottom	O	5	47nH
L6176	CHIP COIL 120N J Q32/150MHZ 0603	Bottom	P	4	120nH
L7000	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	C	8	600R/ 100MHz
L7001	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	C	8	600R/ 100MHz
L7010	FERR.BEAD 240R7100M 0.4A 0R4 0402	Bottom	I	5	240R/ 100MHz
L7011	FERR.BEAD 240R7100M 0.4A 0R4 0402	Bottom	I	5	240R/ 100MHz
L7500	CHIP COIL 12N J Q31/800M 0402	Top	H	5	12nH
L7501	CHIP COIL 12N J Q31/800M 0402	Top	H	5	12nH

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Item	Name	PWB side	X	Y	Value
L7502	FERRITE BEAD 0.6R 600R/100MHZ 0402	Top	I	4	600R/ 100MHz
L7503	CHIP COIL 27N J Q27/800M 0402	Top	I	7	27nH
L7504	CHIP COIL 22N J Q28/800M 0402	Top	H	5	22nH
L7505	CHIP COIL 22N J Q28/800M 0402	Top	H	5	22nH
L7515	CHIP COIL 15N J Q30/800M 0402	Top	G	3	15nH
L7560	CHIP COIL 15N J Q30/800M 0402	Top	H	3	15nH
M2100	SMD VIBRA MOTOR 1.3V 90MA 9000RPM	Bottom	F	7	~
N2000	TI ANALOG SWITCH TS5A3159DCKR	Top	O	8	~
N2001	TI ANALOG SWITCH TS5A3159DCKR	Top	P	8	~
N2101	AF AMP TPA2012D2 77DB/217HZ CSP	Bottom	M	9	~
N2300	TAHVO V5.2 LF TFBGA84	Top	K	7	~
N2301	WHITE LED DRIVER 4LEDS 500MW 8BUMP USMD8	Top	K	9	~
N3300	DC/DC CONV LM3671TLX-1.82V USMD5	Bottom	I	4	~
N6030	BC4-ROM1.0RDL	Bottom	O	3	~
N6156	FM RECEIVER TEA5761UK N4B CSP (TI)	Bottom	O	5	~
N7505	AHNE301A TRANCEIVER RFIC TFBGA144	Top	H	4	~
N7520	PA RF9282E6.3 GSM/EDGE 850/900/1800/1900	Top	H	7	~
R2000	Resistor 5% 63mW	Top	P	5	220R
R2001	ASIP MIC W/ESD RES+CAP+ZDI BGA11	Top	P	6	~
R2002	Resistor 5% 63mW	Top	P	7	10R
R2003	Resistor 5% 63mW	Top	P	7	10R
R2004	Resistor 5% 63mW	Top	P	7	10R
R2005	Resistor 5% 63mW	Top	P	7	10R
R2006	ASIP 4XESD **PB-FREE** BGA5	Bottom	P	7	~
R2007	ASIP SILIC USB OTG / ESD BGA11	Bottom	Q	6	~
R2008	Resistor 5% 63mW	Bottom	P	6	220k
R2009	Resistor 5% 63mW	Top	P	6	10k
R2010	Resistor 5% 63mW	Bottom	P	5	100R
R2017	Resistor 5% 63mW	Bottom	O	8	120k
R2070	CHIP VARISTOR VWM14V VC50V 0402	Bottom	H	6	14V/50V
R2100	ASIP SINGLE ENDED MICROPHONE INTERF BGA8	Top	P	7	~
R2101	Resistor 5% 63mW	Top	Q	8	220R
R2102	Chipres 0W06 jumper 0402	Top	O	7	0R
R2103	Chipres 0W06 jumper 0402	Top	O	7	0R

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Item	Name	PWB side	X	Y	Value
R2104	CHIP VARISTOR VWM14V VC50V 0402	Bottom	K	6	14V/50V
R2105	CHIP VARISTOR VWM14V VC50V 0402	Bottom	J	6	14V/50V
R2106	CHIP VARISTOR VWM14V VC50V 0402	Top	G	6	14V/50V
R2107	CHIP VARISTOR VWM14V VC50V 0402	Top	G	5	14V/50V
R2114	CHIP VARISTOR VWM14V VC50V 0402	Top	G	8	14V/50V
R2115	CHIP VARISTOR VWM14V VC50V 0402	Top	G	9	14V/50V
R2200	Resistor 5% 63mW	Top	N	9	100k
R2201	Resistor 5% 63mW	Top	N	8	120k
R2202	Resistor 5% 63mW	Top	M	6	1k0
R2203	Resistor 5% 63mW	Top	N	6	1k0
R2204	Resistor 5% 63mW	Top	N	6	1k0
R2205	Resistor 5% 63mW	Top	N	6	1k0
R2206	Chipres 0W06 jumper 0402	Top	N	6	0R
R2207	Chipres 0W06 jumper 0402	Top	N	6	0R
R2208	Chipres 0W06 jumper 0402	Top	N	6	0R
R2209	Chipres 0W06 jumper 0402	Top	N	6	0R
R2212	Resistor 5% 63mW	Top	M	6	470R
R2213	Resistor 5% 63mW	Top	N	8	4k7
R2214	Resistor 5% 63mW	Top	N	8	4k7
R2216	CHIPRES 0W06 2M2 J 0402	Top	N	8	2M2
R2307	Resistor 5% 63mW	Top	H	8	100R
R2401	Resistor 5% 63mW	Top	O	5	100k
R2404	CHIP VARISTOR VWM14V VC50V 0402	Bottom	J	9	14V/50V
R2405	ASIP SIM INTERFACE **LOW CAP**BGA8	Bottom	K	2	~
R2406	Resistor 5% 63mW	Bottom	J	9	27k
R2407	Resistor 5% 63mW	Top	P	9	220R
R2408	Resistor 5% 63mW	Top	P	9	10k
R2409	ASIP SIM INTERFACE **LOW CAP**BGA8	Bottom	N	9	~
R2410	Chipres 0W06 jumper 0402	Bottom	J	8	0R
R2411	Resistor 5% 63mW	Bottom	J	3	33R
R2412	Resistor 5% 63mW	Bottom	J	3	33R
R2413	RES NETWORK 0W03 4X33R J 0804	Bottom	J	3	4x33R
R2414	RES NETWORK 0W03 4X100R J 0804	Bottom	J	4	4x100R
R2415	RES NETWORK 0W03 4X100R J 0804	Bottom	K	4	4x100R
R2417	NTC RES 47K J B=4050+-3% 0402	Top	P	6	47k

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Item	Name	PWB side	X	Y	Value
R2421	Resistor 5% 63mW	Bottom	K	8	33R
R2700	ASIP SIM INTERFACE **LOW CAP**BGA8	Bottom	K	5	~
R2701	CHIPRES JUMPER 0603	Bottom	L	2	0R
R2801	Chipres 0W06 jumper 0402	Top	K	5	0R
R2803	Resistor 5% 63mW	Top	L	5	100R
R2804	Resistor 5% 63mW	Top	L	5	100R
R3000	Resistor 5% 63mW	Top	M	2	4k7
R3002	Chipres 0W06 jumper 0402	Top	K	5	0R
R3003	Resistor 5% 63mW	Top	M	3	4k7
R3004	Resistor 5% 63mW	Top	M	4	4k7
R3300	Resistor 5% 63mW	Bottom	H	3	4k7
R3301	Resistor 5% 63mW	Bottom	H	3	4k7
R3306	Resistor 5% 63mW	Bottom	H	3	100R
R3307	Resistor 5% 63mW	Bottom	H	3	100R
R3312	Resistor 5% 63mW	Top	O	5	1k0
R3313	Resistor 5% 63mW	Top	O	5	1k0
R3314	Resistor 5% 63mW	Top	M	2	47R
R6010	Resistor 5% 63mW	Bottom	L	2	330R
R6011	Resistor 5% 63mW	Bottom	M	2	27k
R6013	Resistor 5% 63mW	Bottom	N	2	1k2
R6014	Resistor 5% 63mW	Bottom	N	2	2k2
R6015	Chipres 0W06 jumper 0402	Bottom	N	2	0R
R6030	Resistor 5% 63mW	Bottom	P	4	10k
R6031	Resistor 5% 63mW	Bottom	O	2	10k
R6032	CHIPRES 0W06 2R2 J 0402	Bottom	O	4	2R2
R6034	Resistor 5% 63mW	Bottom	P	2	10k
R6040	Resistor 5% 63mW	Bottom	O	2	100k
R6156	Chipres 0W06 jumper 0402	Bottom	O	5	0R
R6159	Resistor 5% 63mW	Bottom	P	6	10k
R6160	Resistor 5% 63mW	Bottom	P	6	100k
R6161	Chipres 0W06 jumper 0402	Bottom	O	4	0R
R7000	CHIPRES JUMPER 0603	Bottom	C	8	0R
R7501	Resistor 5% 63mW	Top	H	3	2k2
R7502	CHIPRES 0W06 10K F 0402	Top	G	4	10k
R7503	Resistor 5% 63mW	Top	I	4	4k7

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Item	Name	PWB side	X	Y	Value
R7505	CHIPRES 0W06 8K2 F 0402	Top	H	3	8k2
R7506	Resistor 5% 63mW	Top	H	4	10R
R7507	Resistor 5% 63mW	Top	G	4	10R
R7508	Resistor 5% 63mW	Top	H	3	10R
R7509	Resistor 5% 63mW	Top	I	3	22k
R7510	Resistor 5% 63mW	Top	I	7	15R
R7522	CHIPRES 0W06 27K F 0402	Top	I	7	27k
R7523	Chipres 0W06 jumper 0402	Top	G	7	0R
S2401	SM SW TACT SPST 12V 50MA SIDE KEY	Bottom	H	2	~
S2402	SM SW TACT SPST 12V 50MA SIDE KEY	Bottom	J	2	~
S2403	SM SW TACT SPST 12V 50MA SIDE KEY	Bottom	I	9	~
S2404	SM SW TACT SPST 12V 50MA SIDE KEY	Bottom	O	9	~
T7501	TRANSF BALUN 3800+-550MHZ 0805	Top	H	3	~
T7520	TRANSF BALUN 1800+-100mhz 2x1.25	Top	G	8	~
V2000	ASIP TVS BGA4	Bottom	P	4	~
V2001	TR DTC143ZM N RB=4K7 RBE=47K VMT3	Top	O	6	~
V2302	SCH DI 30V 2A SOD323F	Top	I	8	~
V2401	TRX2 BIPOLAR 2XPNP 40V 0A1 0W12 SOT666	Top	P	9	~
V2402	TR DTC143ZM N RB=4K7 RBE=47K VMT3	Top	O	9	~
V6010	Tr NPN 12V 35mA SOT323	Bottom	M	2	~
X2000	CONN DC-JACK 2.0MM 3POL SPR 90DEG	Bottom	Q	3	~
X2001	SM SYSTEM CONNECTOR 14POL	Bottom	Q	6	~
X2060	MODULE ID COMPONENT 2.8X1.8X0.3	Bottom	H	6	~
X2070	CONN BATT 3.5V 2A P3.7 H4.5MM	Bottom	G	7	~
X2400	SM CONN 20P P0.47 PWB/PWB	Top	P	4	~
X2402	SM B2B 2X17 P0.4 F 30V 0.3A FEMALE	Bottom	I	8	~
X2700	SM SIM CONN 11POL H2.0	Bottom	M	5	~
X3300	SMIA85 SOCKET	Bottom	F	3	~
X7000	SM CONN RF JACK 50R 2W 6GHZ	Bottom	E	7	~
Z2000	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	Q	5	600R/ 100MHz
Z2001	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	Q	6	600R/ 100MHz
Z2003	FERRITE BEAD 0.6R 600R/100MHZ 0402	Bottom	Q	5	600R/ 100MHz
Z2400	ASIP 10-CH ESD EMI FILTER BGA25	Top	O	3	~

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Item	Name	PWB side	X	Y	Value
Z6030	LTCC FILT 2441.75+-41.75MHZ 2.5X2	Bottom	0	2	2441.75MHz
Z7001	PHASE SHIFTER GSM1800/1900 TX TDK	Bottom	D	7	1800/1900MHz
Z7002	PHASE SHIFTER GSM1800/1900 TX TDK	Bottom	D	7	1800/1900MHz
Z7501	DUAL RX SAW FILTER 1800/1900MHZ 2016	Top	G	6	1800/1900MHz
Z7503	TX SAW MODULE GSM 850/900MHZ 4.5X3.2	Top	I	6	850/900MHz
Z7504	DUAL RX SAW FILTER 850/900MHZ 2016	Top	H	6	850/900MHz
Z7520	FERRITE BEAD 0R01 28R/100MHZ 0603	Top	G	6	28R/100MHz

Non replaceable parts

These parts must not be replaced:

No.	Name	Comment
1	RAP GSM	
2	VCO	Placed under shielding and is therefore critical and difficult to replace.
3	Module ID component	Only used in production.

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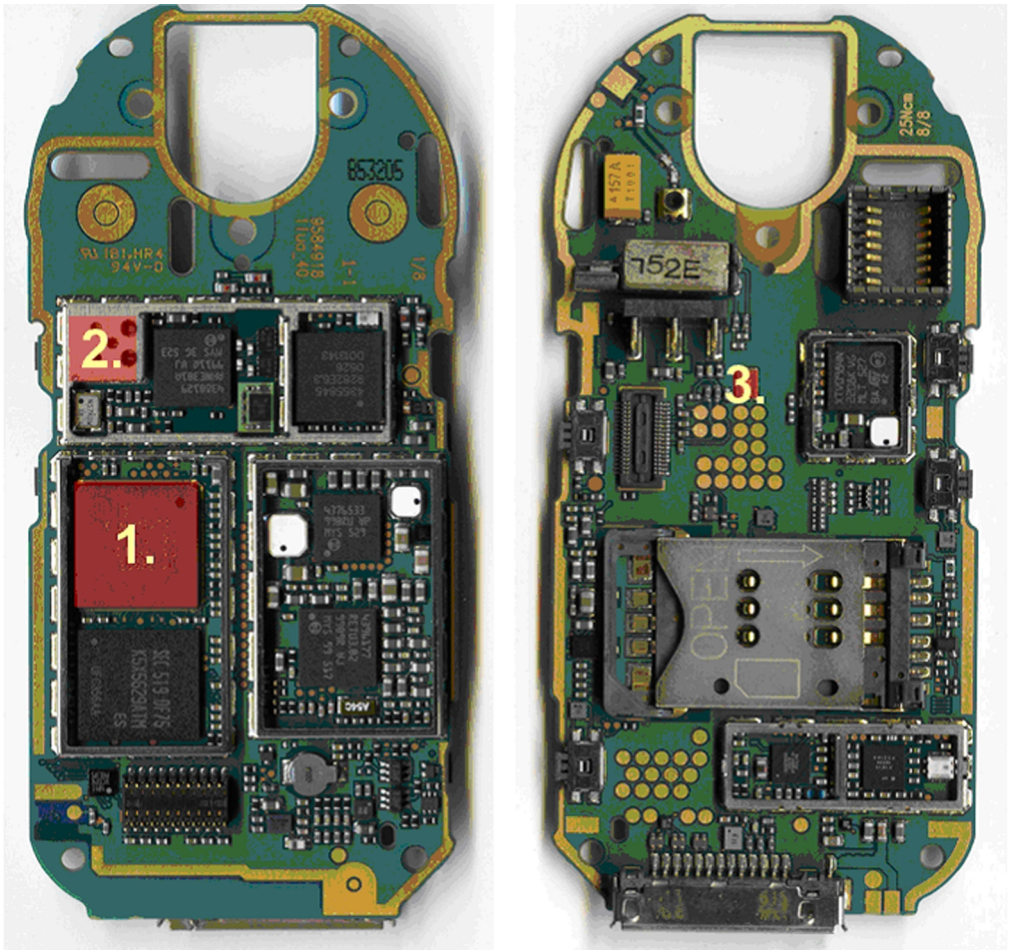

Component layouts

See also large scale layouts in the Schematics section.

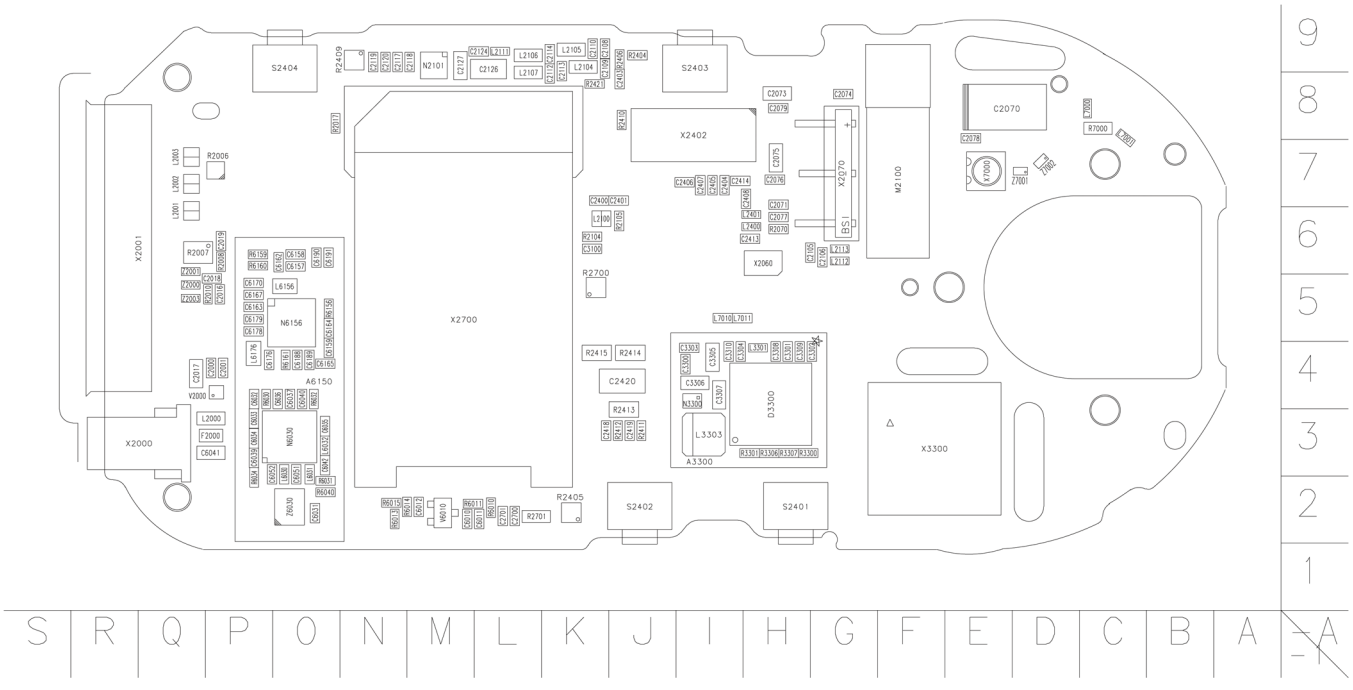

Figure 4 RM-70 Main board component layout, bottom (1lua_50a)

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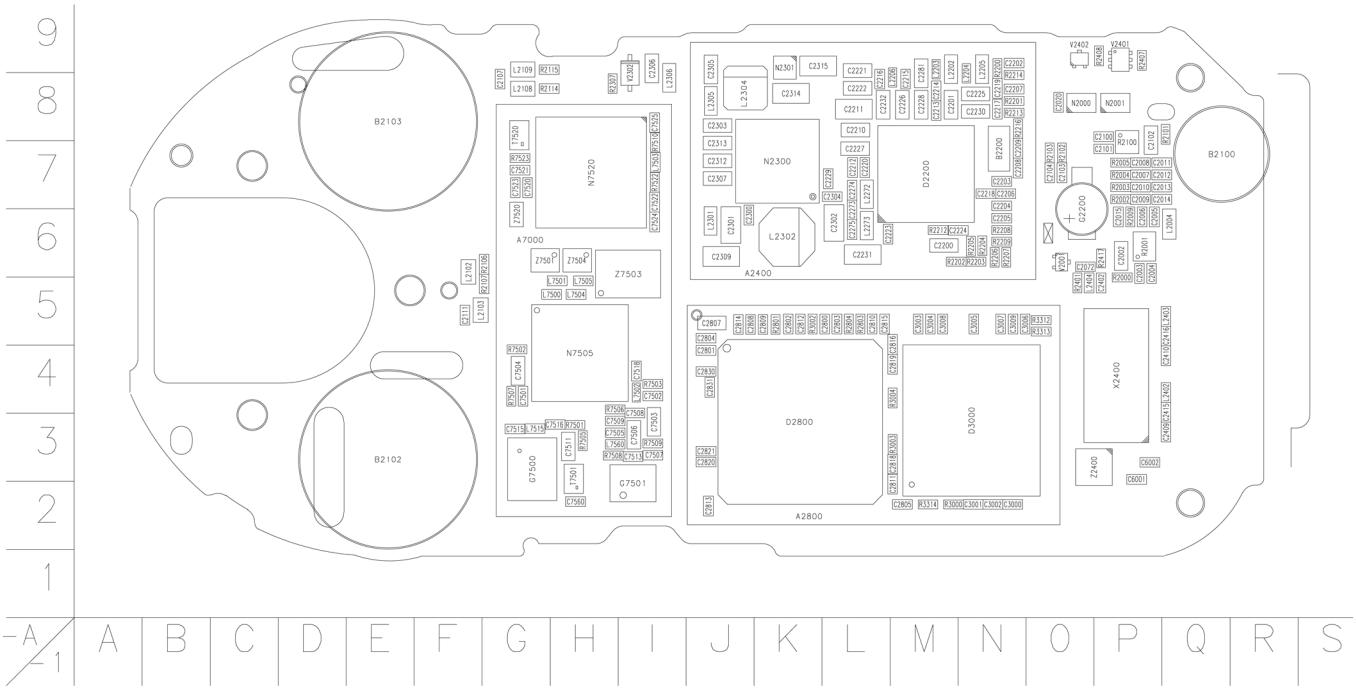

Figure 5 RM-70 Main board component layout, top (1lua_50a)

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3 — Service Software Instructions

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Phoenix installation steps in brief

Before you begin

Recommended hardware requirements:

- Computer processor: Pentium 700 MHz or higher
- RAM 256 MB
- Disk space 100-300 MB

Supported operating systems:

- *Windows 2000* Service Pack 3 or higher
- *Windows XP* Service Pack 1 or higher

Context

Phoenix is a service software for reprogramming, testing and tuning phones.

Phoenix installation contains:

- Service software support for all phone models included in the package
- Flash update package files for programming devices
- All needed drivers for:
  - PKD-1 (DK2) dongle
  - DKU-2 USB cable

    Note: Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless there are updates between *Phoenix* service software releases. If separate update packages are used, they should be used after *Phoenix* and data packages have been installed.

The phone model specific data package includes all changing product specific data:

- Product software binary files
- Files for type label printing
- Validation file for the faultlog repair data reporting system
- All product specific configuration files for *Phoenix* software components

  Note: *Phoenix* and phone data packages should only be used as complete installation packages. Uninstallation should be made from the *Windows* Control Panel.

To use *Phoenix*, you need to:

Steps

1. Connect a PKD-1 (DK2) dongle to the computer parallel port.
2. Install *Phoenix*.
3. Install the phone-specific data package.
4. Configure users.
5. Manage connection settings (depends on the tools you are using).

If you use FPS-8:	• Update FPS-8 software • Activate FPS-8

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If you use FPS-10:	• Update FPS-10 software **Note:** There is no need to activate FPS-10. • Activate SX-4 smart card, if you need tuning and testing functions. **Note:** When FPS-10 is used only for product software updates, SX-4 smart card is not needed.

Results

Phoenix is ready to be used with FPS-8 or FPS-10 flash prommers and other service tools.

Installing *Phoenix*

Before you begin

- Check that a dongle is attached to the parallel port of your computer.
- Download the *Phoenix* installation package (for example, *phoenix_service_sw_2004_39_x_xx.exe*) to your computer (in *C:|TEMP*, for instance).
- Close all other programs.
- Depending on your operating system, administrator rights may be required to install *Phoenix*.
- If uninstalling or rebooting is needed at any point, you will be prompted by the InstallShield program.

Context

At some point during the installation procedure, you may get the following message:

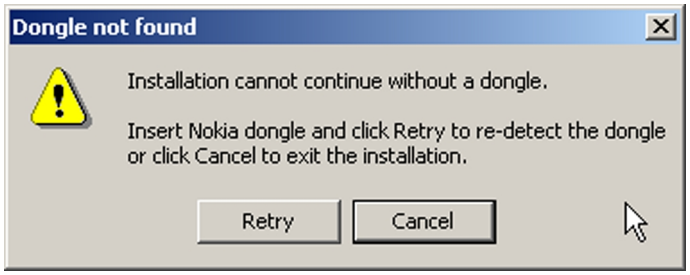

Figure 6 Dongle not found

This may be a result of a defective or too old PKD-1 dongle.

Check the COM/parallel ports used. After correcting the problem, you can restart the installation.

For more detailed information, please refer to *Phoenix* Help files.

Tip: Each feature in *Phoenix* has its own Help function, which can be activated while running the program. Press the **F1** key or the feature's **Help** button to activate a Help file.

Steps

1. To start the installation, run the application file (for example,*phoenix_service_sw_2004_39_x_xx.exe*).
2. In the *Welcome* dialogue, click **Next**.

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3. Read the disclaimer text carefully and click **Yes**.

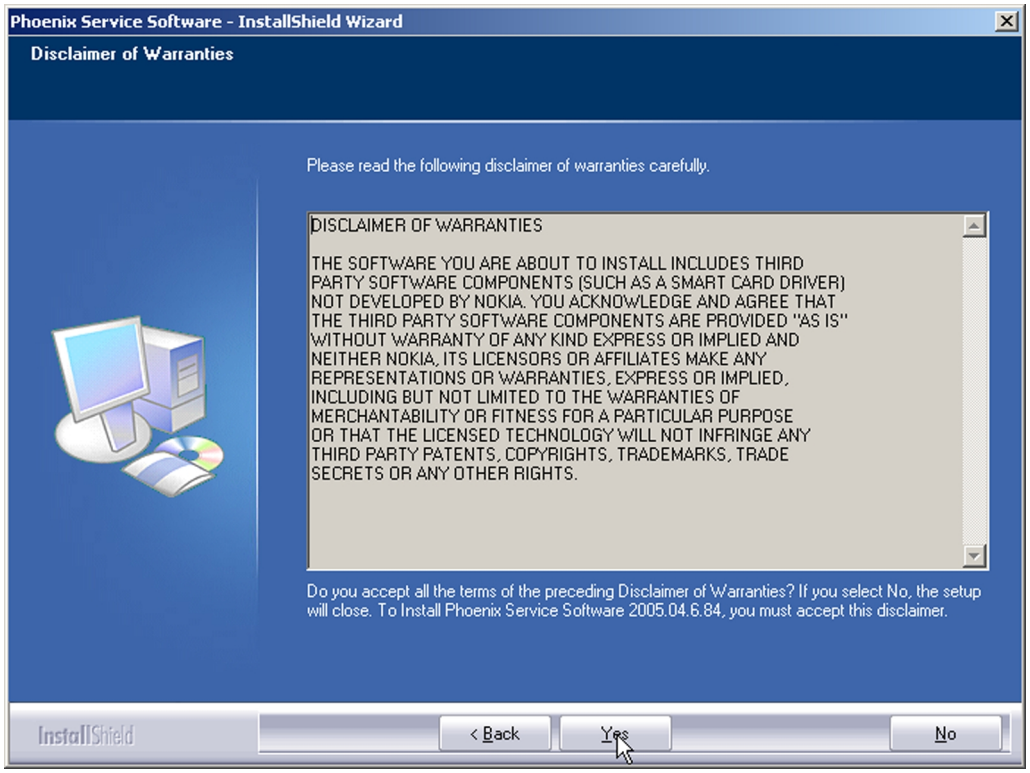

Figure 7 Disclaimer text

4. Choose the destination folder.
   The default folder *C:|ProgramFiles|Nokia|Phoenix* is recommended.
5. To continue, click **Next.**
   To choose another location, click **Browse** (not recommended).
6. Wait for the components to be copied.
   The progress of the installation is shown in the *Setup Status* window.
7. Wait for the drivers to be installed and updated.
   The process may take several minutes to complete.
   If the operating system does not require rebooting, the PC components are registered right away.
   If the operating system requires restarting your computer, the Install Shield Wizard will notifies about it.
   Select **Yes...** to reboot the PC immediately or **No...** to reboot the PC manually afterwards.
   After the reboot, all components are registered.

   Note: *Phoenix* does not work, if the components have not been registered.

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8. To end the installation, click **Finish**.

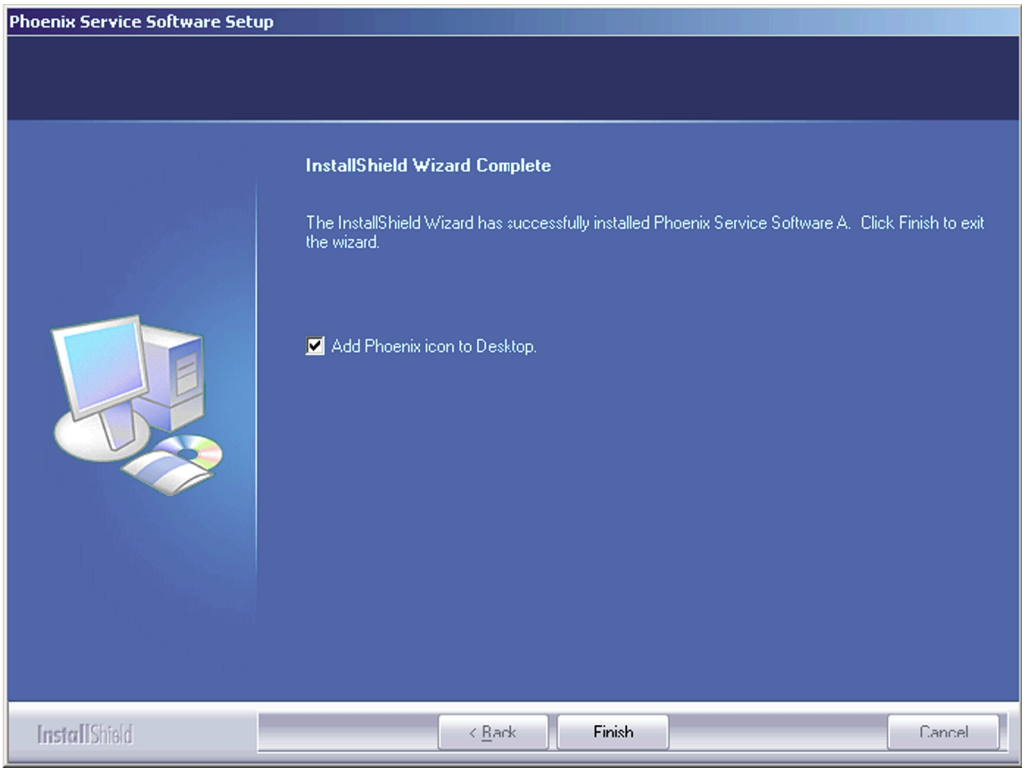

Figure 8 InstallShield Wizard Complete

Next action

After the installation, *Phoenix* can be used after:

- installing phone model specific data package for *Phoenix*
- configuring users and connections

FPS-8 and FPS-10 flash prommers can be used after updating their flash update package files.

Updating *Phoenix* installation

Context

- If you already have the *Phoenix* service software installed on your computer, you need to update the software when new versions are released.
- To update *Phoenix*, you need to follow the same steps as when installing it for the first time.
- When you are updating, for example, from version **a14_2004_16_4_47** to **a15_2004_24_7_55**, the update will take place automatically without uninstallation.
- Always use the latest available versions of both *Phoenix* and the phone-specific data package. Instructions can be found in the phone model specific Technical Bulletins and phone data package *readme.txt* files (shown during installation).
- If you try to update *Phoenix* with the same version you already have (for example, **a15_2004_24_7_55** to **a15_2004_24_7_55**), you are asked if you want to uninstall the existing version. In this case you can choose between a total uninstallation or a repair installation in a similar way when choosing to uninstall the application from the *Windows* Control Panel.
- If you try to install an older version (for example, downgrade from **a15_2004_24_7_55** to **a14_2004_16_4_47**), installation will be interrupted.

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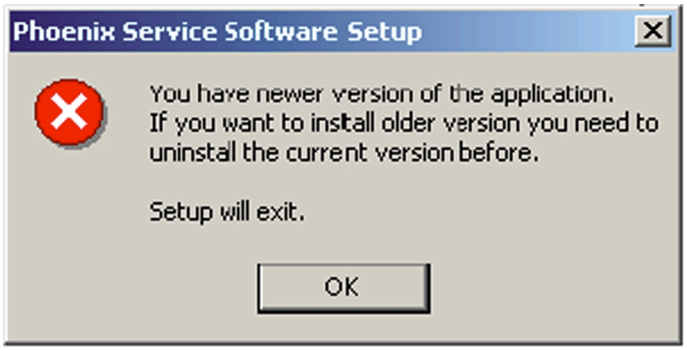

Figure 9 Installation interrupted

- Always follow the instructions on the screen.

Steps

1. Download the installation package to your computer hard disk.
2. Close all other programs.
3. Run the application file (for example, *phoenix_service_sw_2004_39_x_xx.exe*).

Results

A new *Phoenix* version is installed and driver versions are checked and updated.

Uninstalling *Phoenix*

Context

You can uninstall *Phoenix* service software manually from the *Windows* Control Panel.

Steps

1. Open the **Windows Control Panel**, and choose **Add/Remove Programs**.

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2. To uninstall *Phoenix*, choose **Phoenix Service Software→Change/Remove→Remove** .

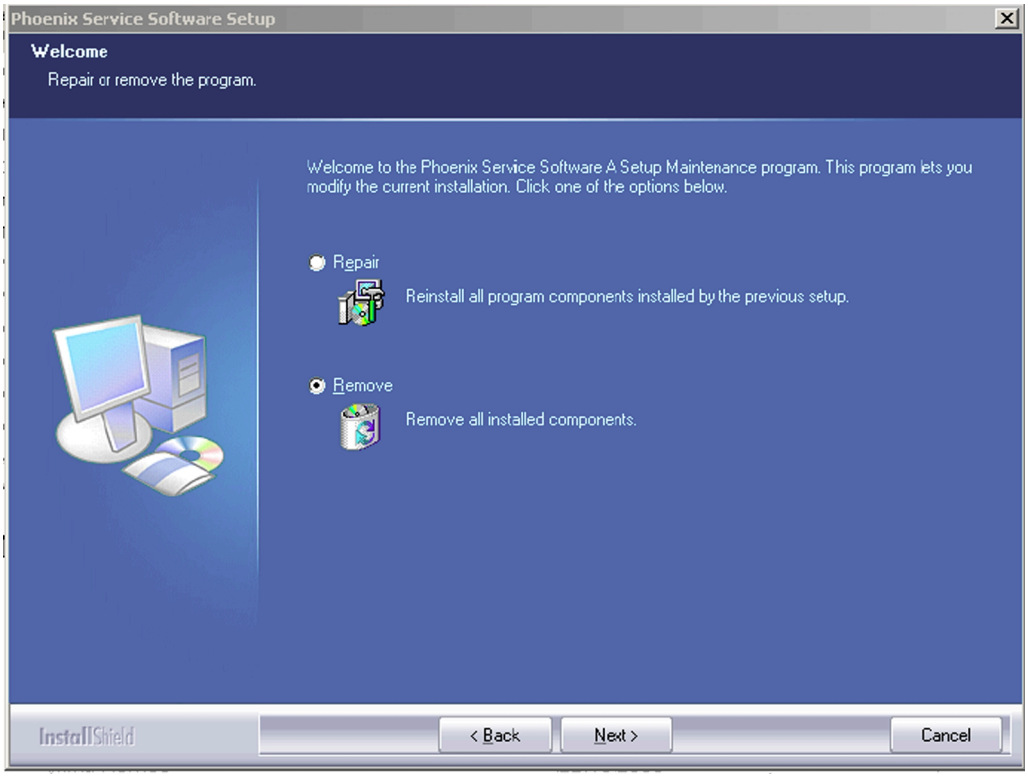

Figure 10 Remove program

The progress of the uninstallation is shown.

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3. If the operating system does not require rebooting, click **Finish** to complete.

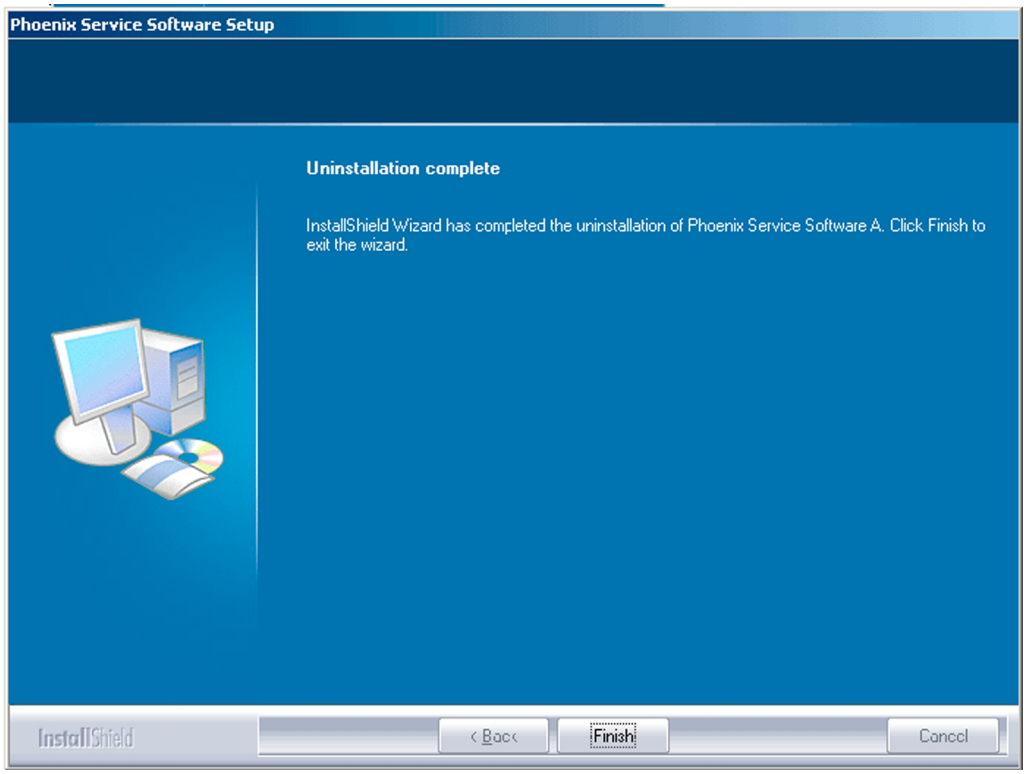

Figure 11 Finish uninstallation

If the operating system requires rebooting, InstallShield Wizard will notify you. Select **Yes...** to reboot the PC immediately and **No...** to reboot the PC manually afterwards.

Repairing *Phoenix* installation

Context

If you experience any problems with the service software or suspect that files have been lost, use the repair function before completely reinstalling *Phoenix*.

Note: The original installation package (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) must be found on your PC when you run the repair setup.

Steps

1. Open **Windows Control Panel→Add/Remove Programs** .
2. Choose **Phoenix Service Software→Change/Remove** .

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3. In the following view, select **Repair**.

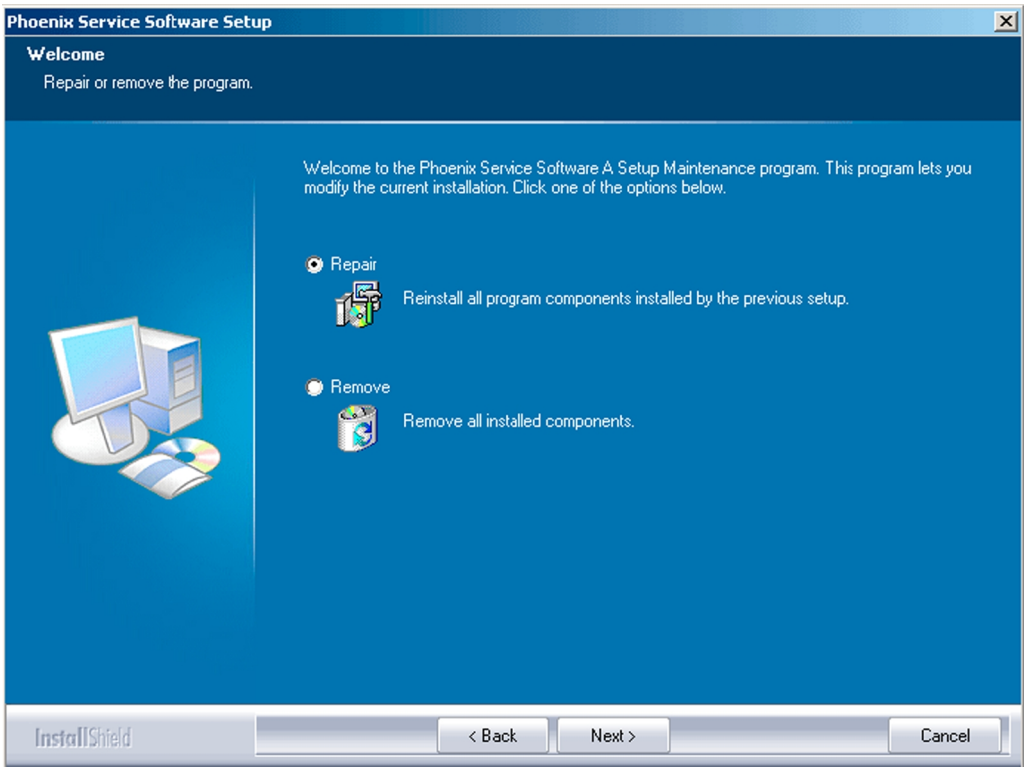

Figure 12 Repair program

Phoenix reinstalls components and registers them.

The procedure is the same as when updating *Phoenix*.

4. To complete the repair, click **Finish**.

Phone data package overview

Each product has its own data package (DP). The product data package contains all product-specific data files to make the Phoenix service software and tools usable with a certain phone model.

The phone data package contains the following:

- Product software binary files
- Files for type label printing
- Validation file for the fault log repair data reporting system
- All product-specific configuration files for Phoenix software components

Data files are stored in **C:\Program Files\Nokia\Phoenix** (default).

Installing phone data package

Before you begin

- A phone-specific data package contains all data required for the *Phoenix* service software and service tools to be used with a certain phone model.
- Check that a dongle is attached to the parallel port of your computer.
- Install *Phoenix* service software.

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- Download the installation package (for example, *XX-XX_dp_EA_v_1_0.exe*) to your computer (for example, in C:\TEMP).
- Close all other programs.

(XX-XX = type designator of the product)

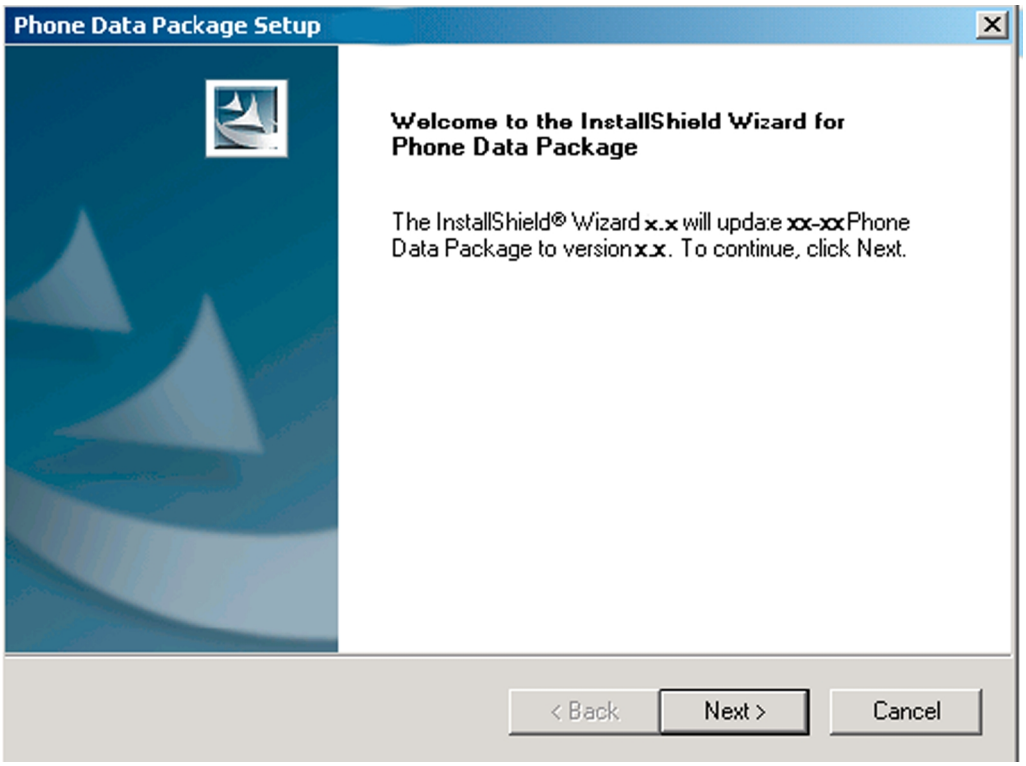
If you already have *Phoenix* installed on your computer, you will need to update it when a new version is released.

> **Note:** Often *Phoenix* and the phone-specific data package come in pairs, meaning that a certain version of *Phoenix* can only be used with a certain version of a data package. Always use the latest available versions of both. Instructions can be found in phone-specific Technical Bulletins and *readme.txt* files of data packages.

Steps

1. To start the installation, run the application file (for example, *XX-XX_dp_EA_ v_1_0.exe*),

   Wait for the installation files to be extracted.
2. Click **Next**.



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3. In the following view you can see the contents of the data package. Read the text carefully. There is information about the *Phoenix* version required with this data package.

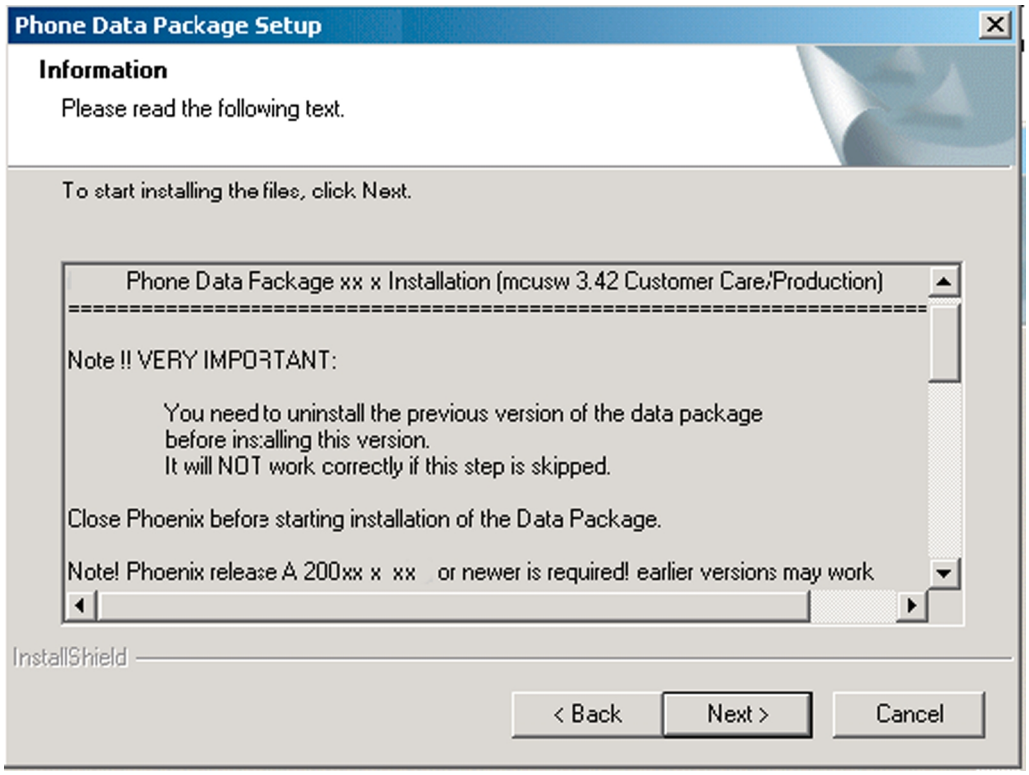

Figure 13 Data package setup information

4. To continue, click **Next**.

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5. Choose the destination folder, and click **Next** to continue.

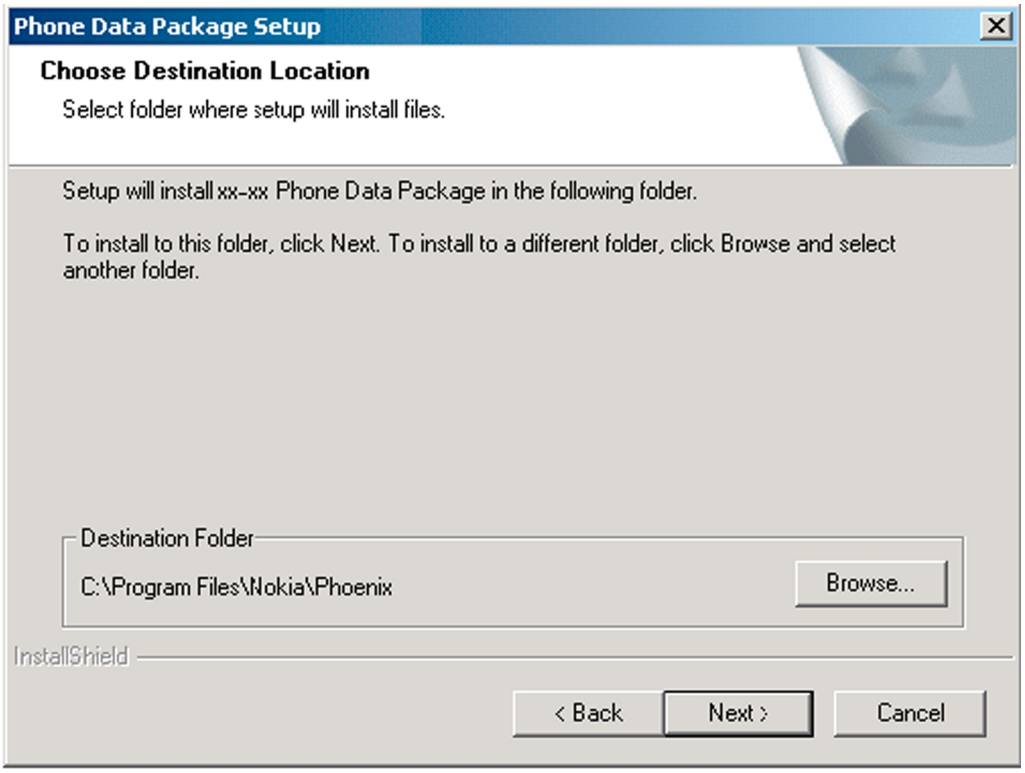
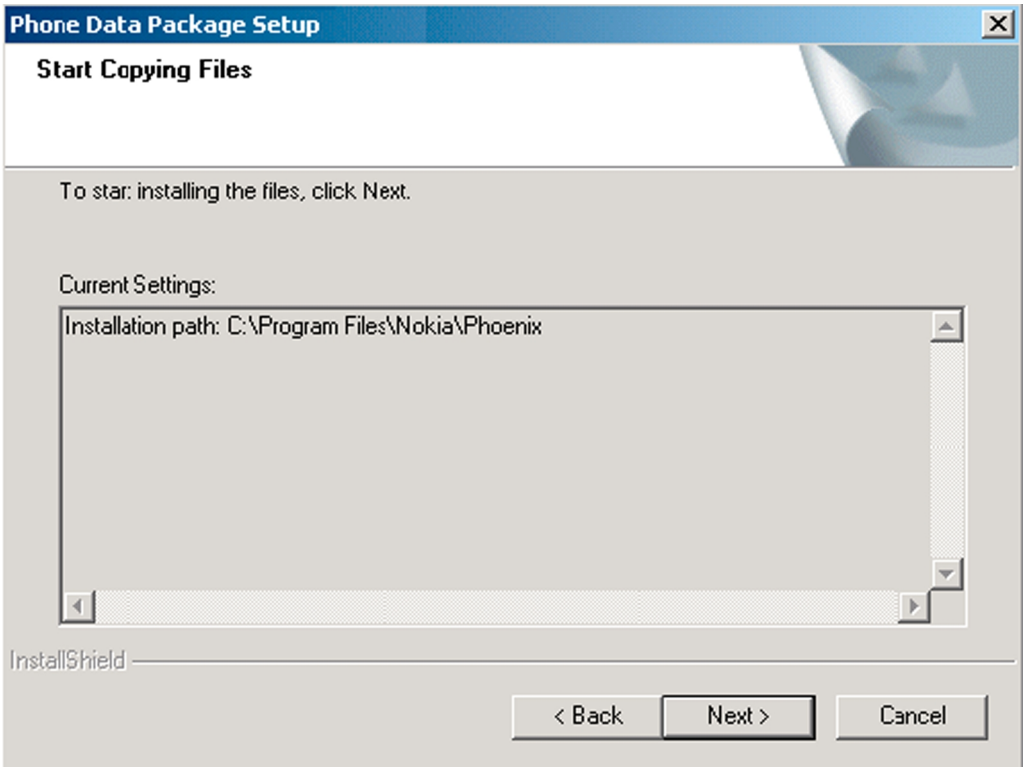


Figure 14 Data package destination folder

The InstallShield Wizard checks where *Phoenix* is installed, and the directory is shown.

6. To start copying the files, click **Next**.



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Phone model specific files are installed. Please wait.

7. To complete the installation, click **Finish**.

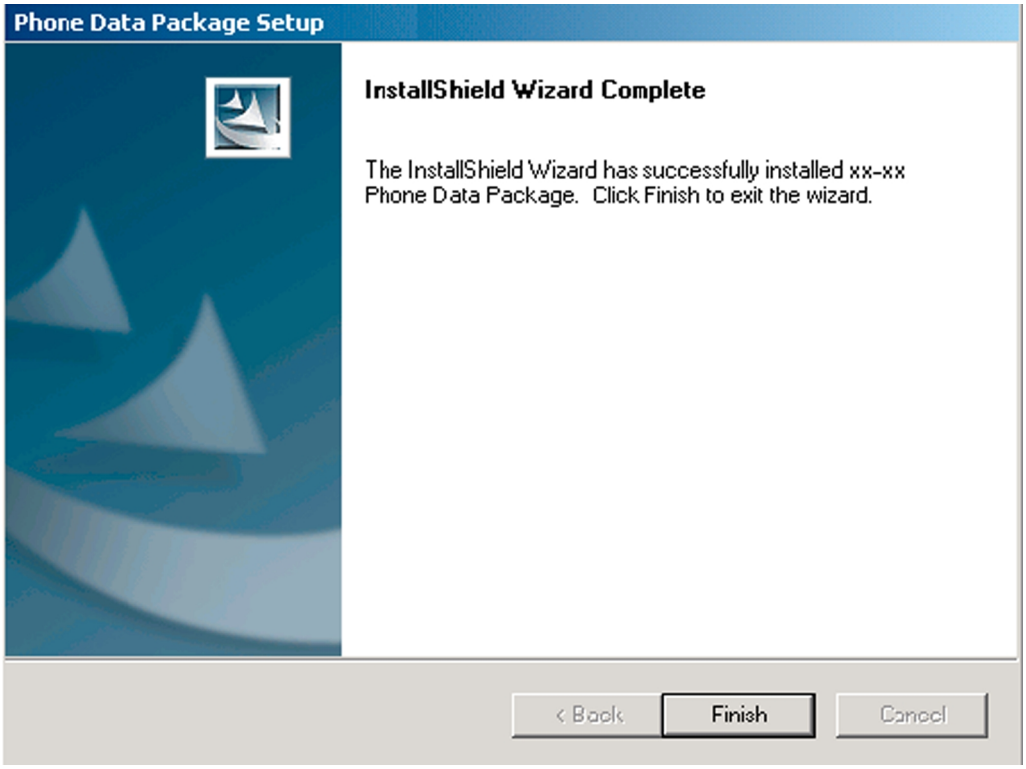

Figure 15 InstallShield Wizard Complete

Next action

Phoenix can be used for flashing phones and printing type labels after:

- Configuring users
- Managing connections

FPS-8 and FPS-10 can be used after updating their flash update package files.

Uninstalling phone data package

Context

There is no need to uninstall an older version of a data package, unless instructions to do so are given in the *readme.txt* file of the data package and bulletins related to the release.

Please read all related documents carefully.

Steps

1. Locate the data package installation file (e.g. *XX-XX_dp_EA_v_1_0.exe*) from your computer.
2. To start the uninstallation procedure, double-click the data package installation file.

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3. To uninstall the data package, click **OK** or to interrupt the uninstallation, click **Cancel**.

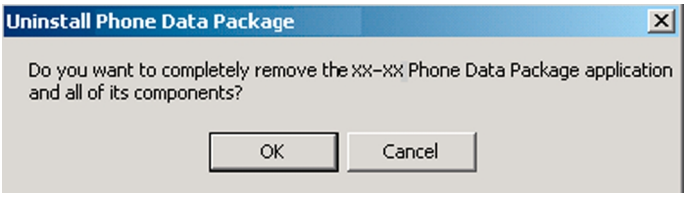

Figure 16 Uninstalling phone data package

4. When the data package is uninstalled, click **Finish**.

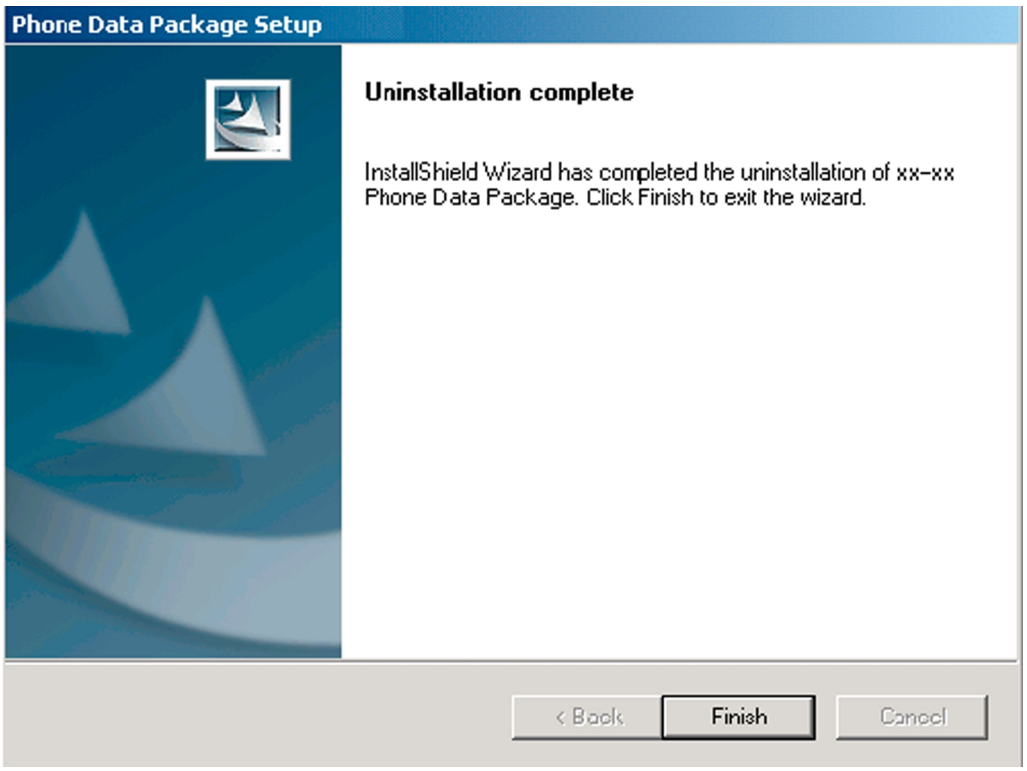

Figure 17 Finishing data package uninstallation

Alternative steps

- You can also uninstall the data package manually from **Control Panel→Add/Remove Programs→xx-xx* Phone Data Package** . (*= type designator of the phone).

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Configuring users in *Phoenix*

Steps

1. Start *Phoenix* service software, and log in.

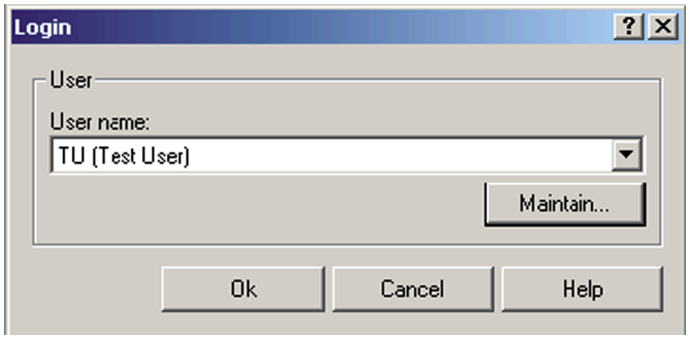

Figure 18 Phoenix login

   If the user ID is already configured, select s/he from the *User name* drop-down list, and click **OK**.
2. To add a new user, or to edit existing ones, click **Maintain**.
3. To add a new user, click **New**.
4. Type in the name and initials of the user, and click **OK**.
   The user is added to the user name list.
5. Select the desired user from the *User name* drop-down list, and click **OK**.

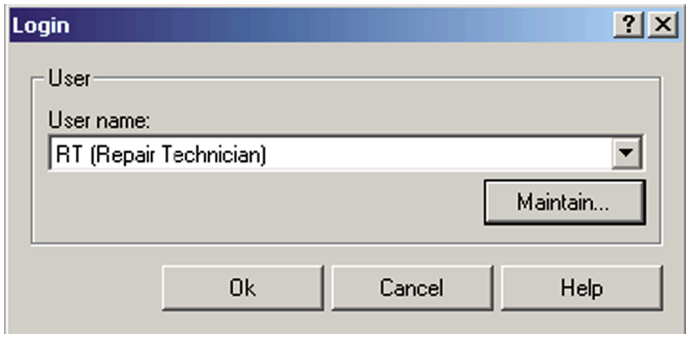

Figure 19 New user configured

Managing connections in *Phoenix*

Context

With the **Manage Connections** feature you can edit and delete existing connections or create new ones.

> **Note:** After choosing the desired connection, and connecting the phone to a PC for the first time, allow the PC to install the USB device drivers first. Please note that this may take some time to complete.
>
> If there are problems after the driver installation, check that the USB connection is active from the **Windows Control Panel**. If the problem persists, contact the local PC support.

Steps

1. Start *Phoenix*, and log in.
2. Choose **File→Manage Connections...** .

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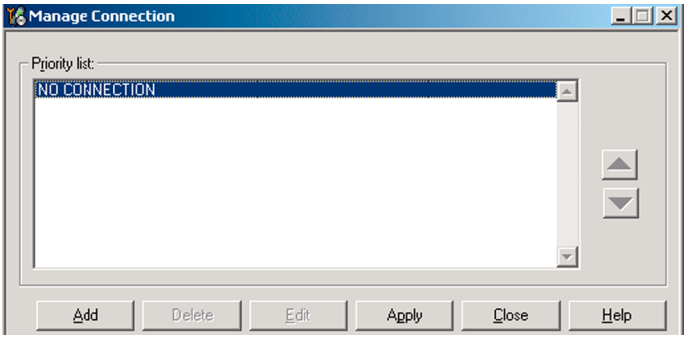
3. To add a new connection, click **Add**.



4. Select **Manual** mode, and click **Next** to continue.

   If you want to create the connection using the Connection Wizard, connect the tools and a phone to your PC. The wizard will automatically try to configure the correct connection.

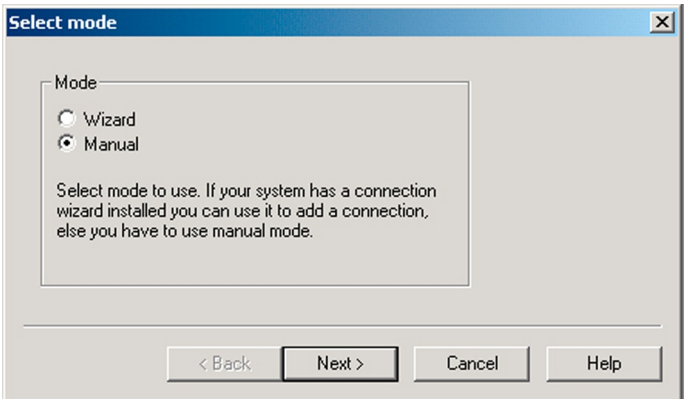


Figure 20 Select mode: Manual

i For an FPS-10 flash prommer with a **USB Connection**, choose the following connection settings:
   - Media: **FPS-10 USB**
   - DEVICE_INDEX: **0**
   - SERIAL_NUM: See Serial No from the label attached to the bottom of FPS-10
   - ACTIVE_MEDIA: **USB**

ii For an FPS-10 flash prommer with a **LAN connection**, choose the following connection settings:
   - Media: **FPS-10 TCP/IP**
   - NET_SERV_NAME: Click **Scan...**. Choose your own FPS-10 device based on the correct MAC address. See Serial No from the label attached to the bottom of your FPS-10.
   - PORT_NUM: Use the default value, and click **Next**.
   - PROTOCOL_FAMILY: Use the default value, and click **Next**.
   - SOCKET TYPE: Use the default value, and click **Next**.
   - TX_BUFFER_SIZE: Use the default value, and click **Next**.
   - RX_BUFFER_SIZE: Use the default value, and click **Next**.

iii For an FPS-8 flash prommer, choose the following connection settings:
   - Media: FPS-8
   - PORT_NUM: COM Port where FPS-8 is connected
   - COMBOX_DEF_MEDIA: **FBUS**

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iv For a plain **USB connection**, choose the following connection settings:

Note: First connect the DKU-2 USB cable between the PC USB port and phone.

- Media: USB

5. To complete the configuration, click **Finish**.
6. Click the connection you want to activate. Use the up/down arrows located on the right hand side to move it on top of the list, then click **Apply**.

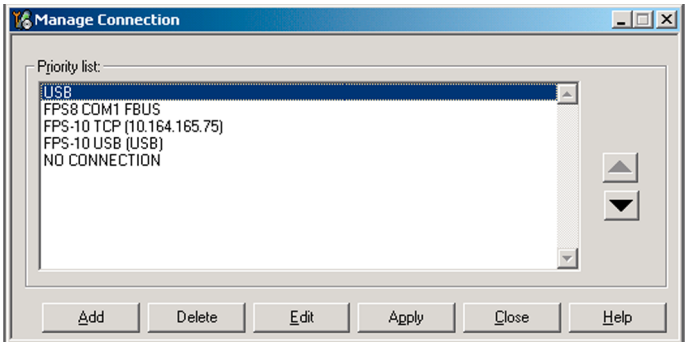

Figure 21 Connections list

The connection is activated, and it can be used after closing the *Manage Connection* window.

The connection information is shown at the right hand bottom corner of the screen.

Figure 22 Connection information

7. To use the connection, connect the phone to your PC with correct service tools. Make sure the phone is switched on, and then choose **File→Scan Product** .

Results

The product support module information appears in the status bar:

Figure 23 Product support module information (example from RM-1)

Installing flash support files for FPS-8 and FPS-10

Before you begin

- Install *Phoenix* service software.
- Install phone model specific data package for *Phoenix*.
- If you want to update the flash support files, they are delivered in the same installation package with *Phoenix* or newer *Phoenix* packages beginning from December 2004.

  In case you want to update the MCU files, install the latest data package (see Technical Bulletins for information on the latest one).

  Normally, it is enough to install *Phoenix* and the phone-specific data package because the installation always includes the latest flash update package files for FPS-8 and FPS-10.
- A separate installation package for flash support files is available. The files can be updated according to these instructions, if updates appear between *Phoenix* data package releases.

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Context

If you are not using a separate installation package, you can skip this section and continue with "Updating FPS-8 and FPS-10 flash prommer software„ (page 3–23) after installing a new phone data package.

Steps

1. To begin the installation, double-click the flash update file (for example, *flash_update_03_183_0014.exe*).

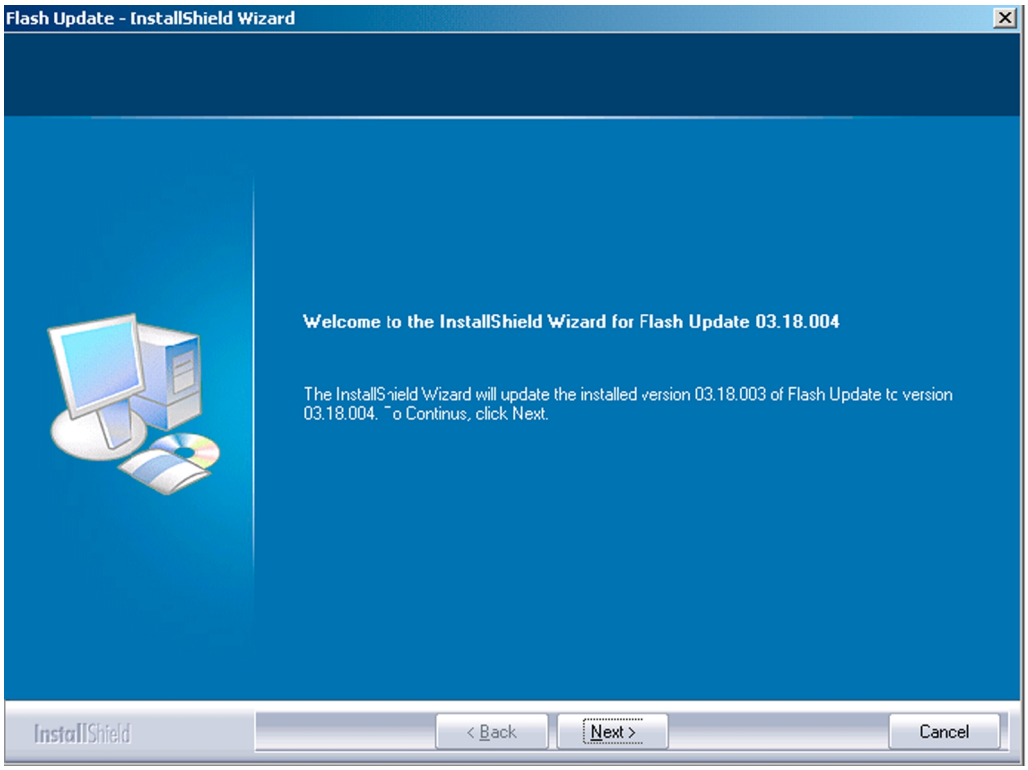

Figure 24 Flash update welcome dialog

If the same version of the flash update package already exists, and you want to reinstall it, the previous package is first uninstalled.

Restart installation again after the uninstallation.

2. If you try to downgrade the existing version to older ones, the setup will be aborted. If there is a need to downgrade the version, uninstall newer files manually from the **Windows Control Panel**, and then rerun the installation.

Figure 25 Flash installation interrupted

If an older version exists on your PC and it needs to be updated, click **Next** to continue installation.

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3. It is recommended to install the files to the default destination folder *C:|Program Files|Nokia|Phoenix*. To continue, click **Next**.

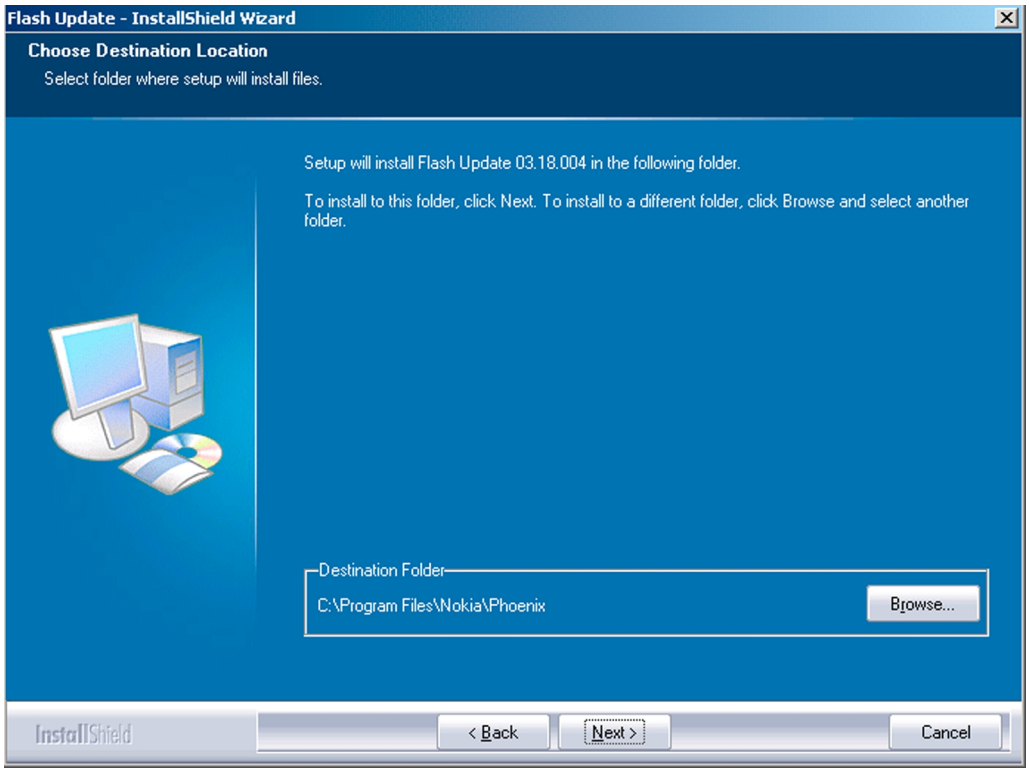

Figure 26 Flash destination folder

When installing the flash update files for the first time, you may choose another location by selecting **Browse** (not recommended).

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4. To complete the installation procedure, click **Finish** .

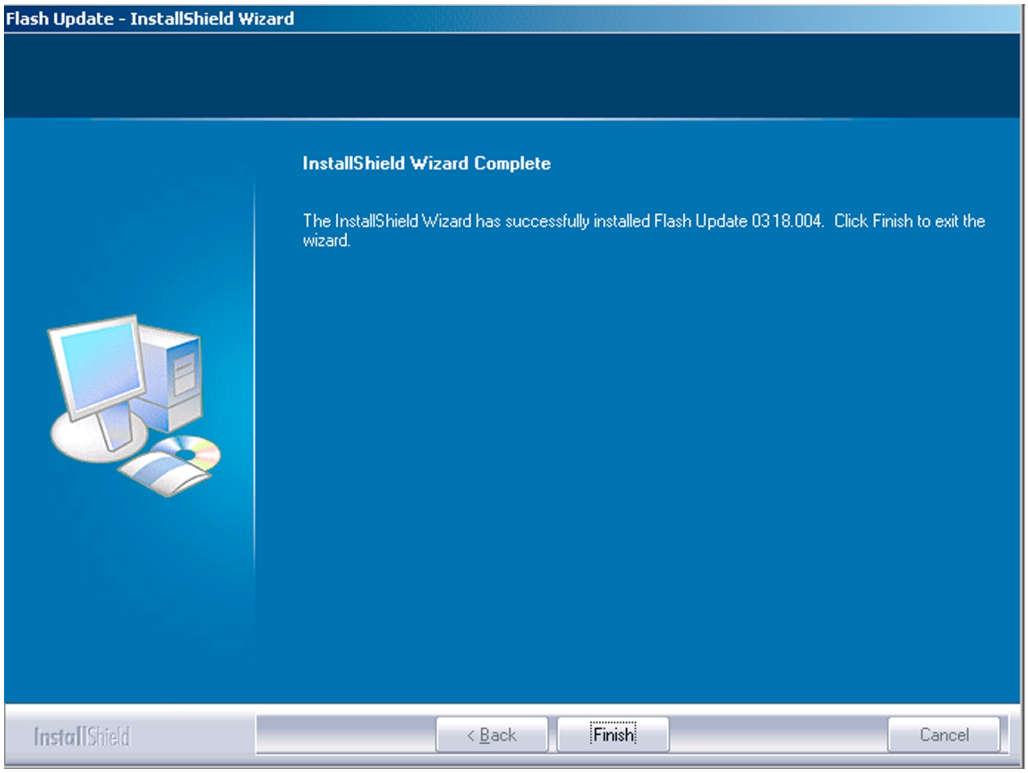

Figure 27 Finish flash update

Next action

FPS-8 and FPS-10 flash prommers must be updated using *Phoenix*.

Updating FPS-8 and FPS-10 flash prommer software

Steps

1. Start *Phoenix* service software, and log in.
2. Choose the correct connection for your flash prommer: **File→Manage Connections...**
3. Choose **Flashing→Prommer maintenance** .

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4. To update the **FPS-8/FPS-10** software, click **Update**, and select the appropriate file *fps8upd.ini* (for FPS-8) or *fpsxupd.ini* (for FPS-10) from *C:|Program Files|Nokia|Phoenix|Flash*.

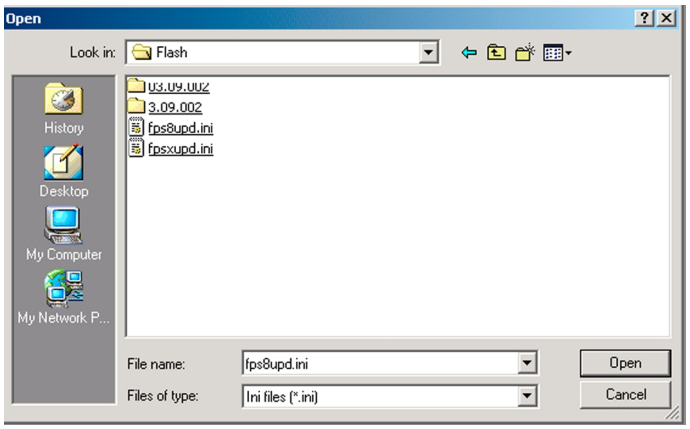

Figure 28 Flash directory window

Tip: All files can be loaded separately to the prommer used. To do this, click the right mouse button in the *Flash Box Files* pane and select the file type(s) to be loaded.

5. Click **OK**.

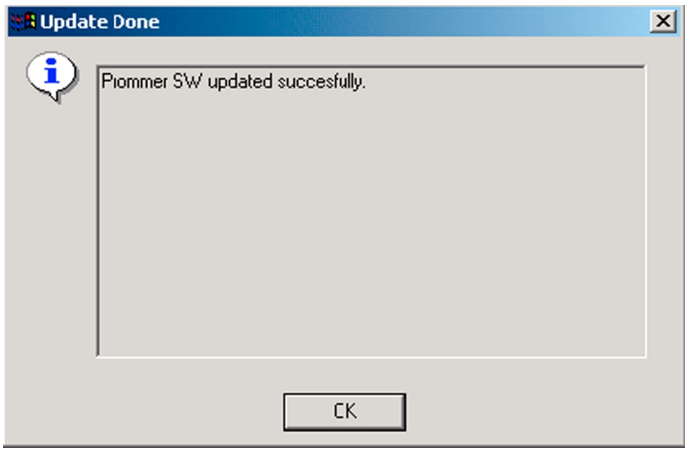

Figure 29 Prommer software update finished

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6. To close the *Prommer Maintenance* window, click **Close**.

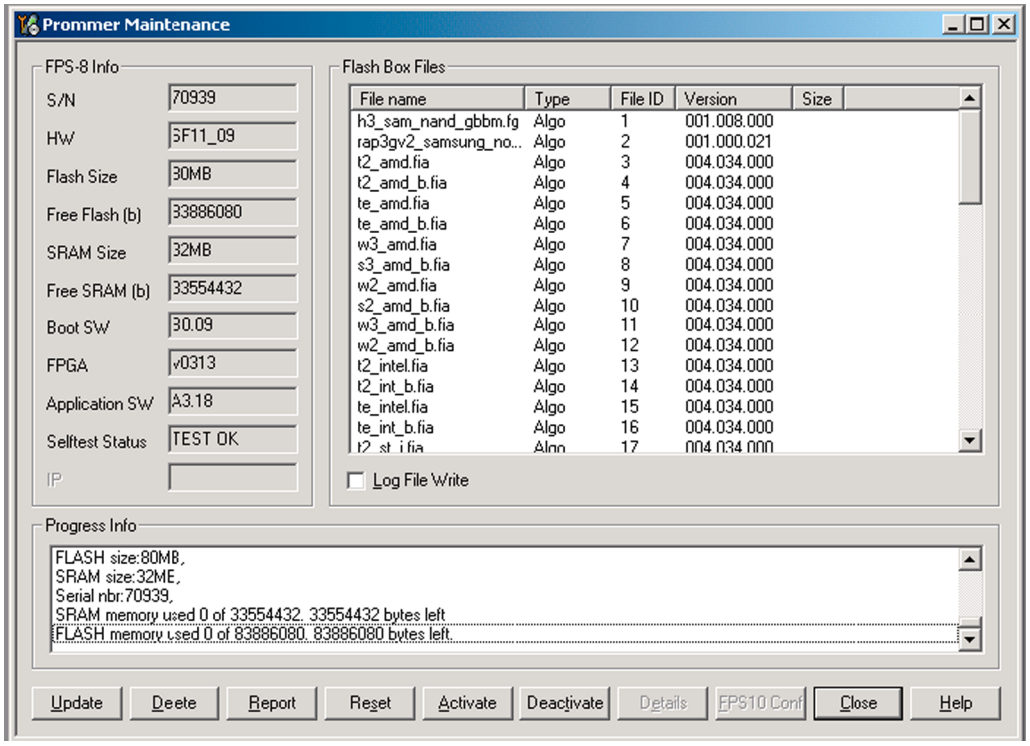

Figure 30 *Prommer Maintenance* window

Activating FPS-8

Context

Before FPS-8 can be successfully used for phone programming, it must first be activated.

First fill in the *FPS-8 activation request* sheet in the FPS-8 sales package, and follow the instructions given.

When activation file is received (for example, *00000.in*), copy it to the *C:|ProgramFiles|Nokia|Phoenix |BoxActivation* directory on your computer (this directory is created when *Phoenix* is installed).

Steps

1. Start *Phoenix* service software.
2. Choose **Flashing→Prommer Maintenance** .
3. In the *Prommer Maintenance* window, click **Activate**.
4. To find the activation file, click **Browse**.

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5. To activate the prommer, select the activation file and click **Open**.

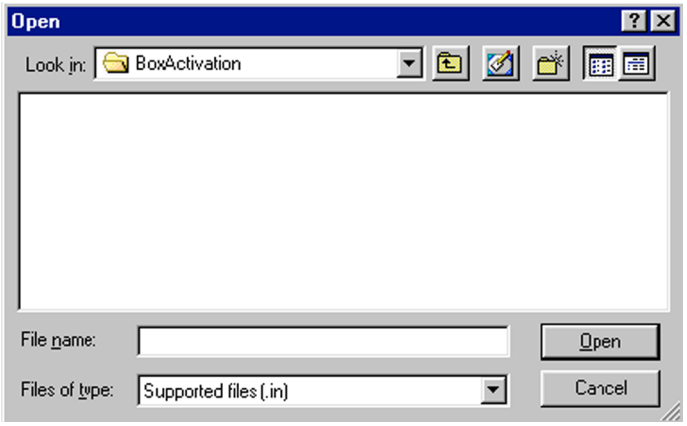

Figure 31 Box activation

6. To complete the activation, restart FPS-8.

Deactivating FPS-8

Context

If there is, for example, a need to send the FPS-8 box for repair, it must be deactivated first.

Steps

1. Start *Phoenix* service software.
2. Choose **Flashing→Prommer Maintenance** .
3. In the *Prommer Maintenance* window, click **Deactivate**.
4. To confirm the deactivation, click **Yes**.

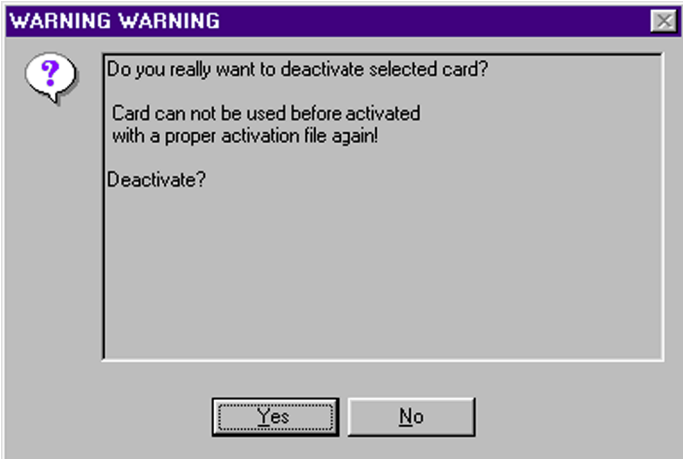

Figure 32 Deactivation warning

The box is deactivated.

5. To complete the deactivation, restart FPS-8.

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4 — Service Tools and Service Concepts

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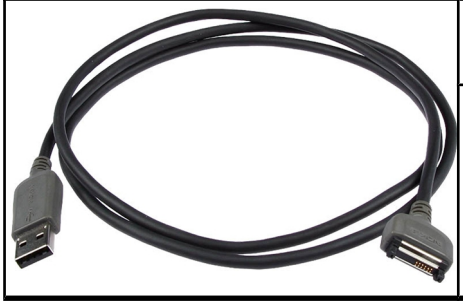
Service tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-70, refer to various concepts.

	CA-35S	Power cable	
	CA-35S is a power cable for connecting, for example, the FPS-10 flash prommer to the Point-Of-Sales (POS) flash adapter.		
	CA-53	USB connectivity cable	
	USB to Pop-Port™ connector cable.		

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CU-4	Control unit	

CU-4 is a general service tool used with a module jig and/or a flash adapter. It requires an external 12 V power supply.

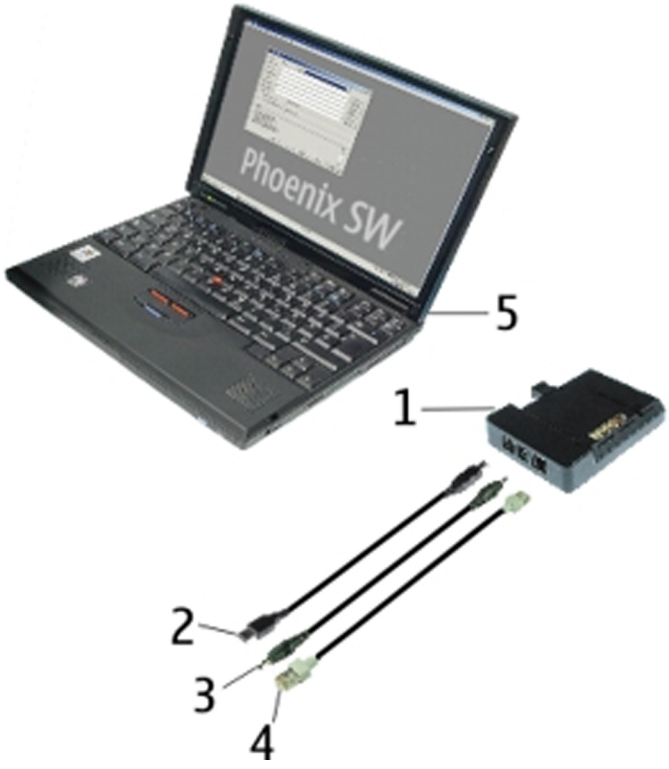
The unit has the following features:

- software controlled via USB
- EM calibration function
- Forwards FBUS/Flashbus traffic to/from terminal
- Forwards USB traffic to/from terminal
- software controlled BSI values
- regulated VBATT voltage
- 2 x USB2.0 connector (Hub)
- FBUS and USB connections supported

When using CU-4, note the special order of connecting cables and other service equipment:

Instructions

1 Connect a service tool (jig, flash adapter) to CU-4.
2 Connect CU-4 to your PC with a USB cable.
3 Connect supply voltage (12 V)
4 Connect an FBUS cable (if necessary).
5 Start Phoenix service software.



Note: Phoenix enables CU-4 regulators via USB when it is started.

Reconnecting the power supply requires a Phoenix restart.

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<table>
<tr><td rowspan="2"> </td><td>DKU-2</td><td>USB connectivity cable</td><td></td></tr>
<tr><td colspan="3">USB to system connector cable.</td></tr>
<tr><td rowspan="2"> </td><td>FPS-10</td><td>Flash prommer</td><td></td></tr>
<tr><td colspan="3">FPS-10 interfaces with:
• PC
• Control unit
• Flash adapter
• Smart card
FPS-10 flash prommer features:
• Flash functionality for BB5 and DCT-4 terminals
• Smart Card reader for SX-2 or SX-4
• USB traffic forwarding
• USB to FBUS/Flashbus conversion
• LAN to FBUS/Flashbus and USB conversion
• Vusb output switchable by PC command
FPS-10 sales package includes:
• FPS-10 prommer
• Power Supply with 5 country specific cords
• USB cable</td></tr>
</table>

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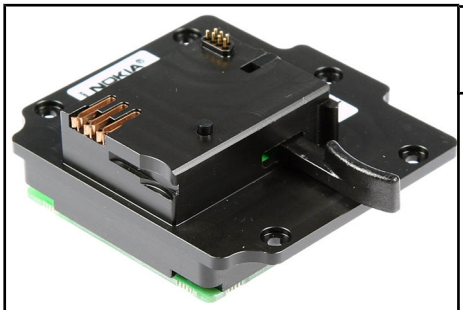

FS-9	Product specific adapter	

The product specific adapter can be used for assembled phones.

FS-9 is an interface between a phone and the concerning SS-46 or SS-62 device. It is needed in case the assembled phone needs to be contacted, except the DKU-2 or the CA-53 cable can be used (over USB).

Features include:

- Compatible to SS-46 (similar to DCT-4 flash adapter), supports flashing
- Compatible to SS-62 (similar to DCT-4 docking station adapter), a PC can be connected by using SS-46 or CU-4
  - Using SS-46: flashing is supported
  - Using CU-4: supports flashing, management calibration is supported. If the RF-coupler SA-76 is attached RF-Go/NoGo testing is supported as well
- Easy phone attachment and detachment
- Reliable phone locking
- Replaceable test pins

Note: When attaching the phone the FS-9 adapter (which might be connected to SS-46 or SS-62/CU-4), the phone powers up in *normal mode* and not in *local mode* like other phones. This has to do with BSI indicator of the battery interfaceRM-70. It is possible to flash the phone like usual or change to *local mode*.

JBT-9	Bluetooth test and interface box (sales package)	

The JBT-9 test box is a generic service device used to perform Bluetooth bit error rate (BER) testing, and establishing cordless FBUS connection via Bluetooth. An ACP-8x charger is needed for BER testing and an AXS-4 cable in case of cordless interface usage testing .

Sales package includes:

- JBT-9 test box
- Installation and warranty information

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MJ-62	Module repair jig	

MJ-62 is meant for component level trouble shooting The jig includes RF interface for GSM and Bluetooth.

General features include:

- Provides mechanical interface for engine module
- Provides galvanic connection to all needed test pads in module
- UI test interface
- Audio components MIC, earpiece, stereo IHF
- Unlimited operation of a disassembled RM-70 phone module
- Power supply via CU-4

Note: CU-4 is needed to operate MJ-62. CU-4 is not part of the MJ-62 sales package and has to be ordered separately.

PCS-1	Power cable	

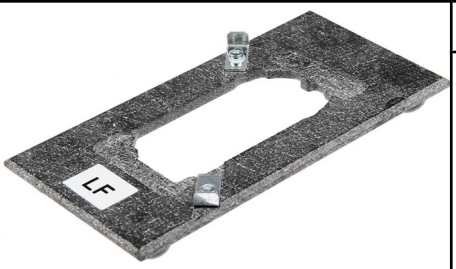
The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled operating voltage.

PKD-1	SW security device	

SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC.

Without the device, it is not possible to use the service software.

Printer or any such device can be connected to the PC through the device if needed.



RJ-68	Soldering jig	

This soldering jig is used for module level repair, either as fixation in µBGA rework places or when there is a need to hold a module on the work bench for any other repair.

Features include:

- Convenient locking mechanism
- Four (optional mount) rubber feet allow usage also on repair benches
- Fixation of phone module in both ways possible (bottom or top side up)
- ESD proof material
- Standard uBGA jig thickness and outer dimensions

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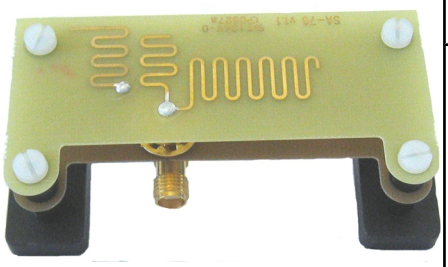
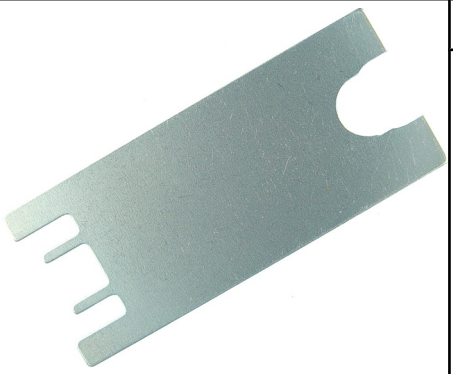
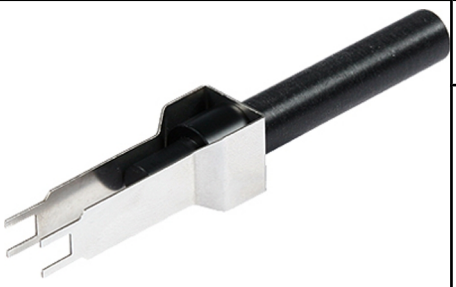
RJ-93	Rework jig	
RJ-93 is used as a rework jig for the engine module. This stencil takes the front end module (FEM) or power amplifier (PA) module for spreading the soldering paste to the component. Must be used together with the ST-40 stencil.		



SA-76	RF coupler	
The SA-76 coupler is for GSM RF testing. The RF antenna coupler for use with interface adapter SS-62 extends CU-4/SS-62/FS-9 set-up to allow RF function tests in GSM bands 900, 1800 and 1900 MHz. SA-76 is not suitable for RF tuning. **Note:** When using the Coupler the phone shall be used in open mode.		



SS-42	Camera tool	
SS-42 is used to remove the camera out of its socket.		



SS-45	Front camera removal tool	
The front camera removal tool SS-45 is used to remove/attach the front camera module from/to the socket.		

SS-46	Interface adapter	
SS-46 acts as an interface adapter between a product-specific flash adapter and FPS-10.		

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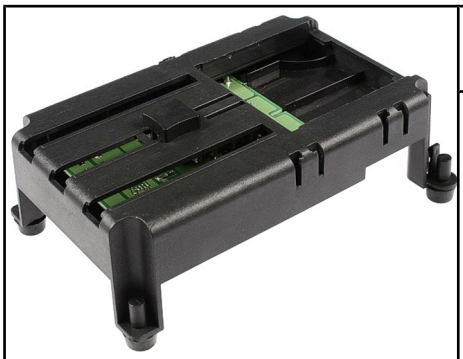


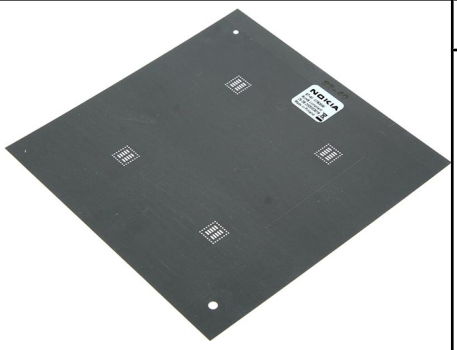
SS-62	Generic flash adapter base for BB5	

- generic base for flash adapters and couplers
- SS-62 equipped with a clip interlock system
- provides standardised interface towards Control Unit
- provides RF connection using galvanic connector or coupler
- multiplexing between USB and FBUS media, controlled by VUSB

SS-71	Domesheet alignment jig	

The domesheet alignment jig will be only supplied for APAC and China regions only.

The purpose of this tool is to simplify the attachment process of the domesheet to the keymat PWB. In other regions the complete assembly (keymat PWB & domesheet is used as a spare part)



ST-40	PA rework stencil	

This stencil is to be used together with RJ-93 and covering FEM module.

XCS-4	Modular cable	

XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.

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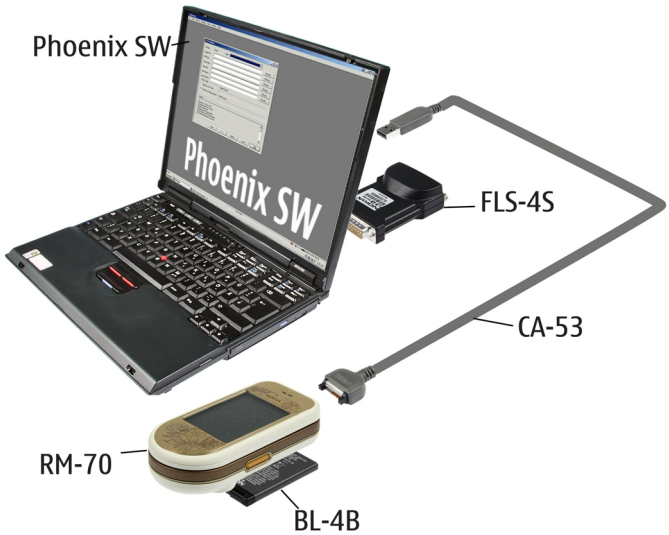
	XRE-2	Bluetooth cable	
	The bluetooth cable connects the bluetooth connector of the module jig to the bluetooth test box JBT-9.		
	XRF-1	RF cable	
	The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment. SMA to N-Connector ca. 610mm. Attenuation for: • GSM850/900: 0.3+-0.1 dB • GSM1800/1900: 0.5+-0.1 dB • WLAN: 0.6+-0.1dB		

Service concepts

POS flash concept

Note: Do not connect an ACP-charger to the phone! This may damage the FEM module.



FPS-10 flash concept

Note: Do not connect an ACP-charger to the phone! This may damage the FEM module.

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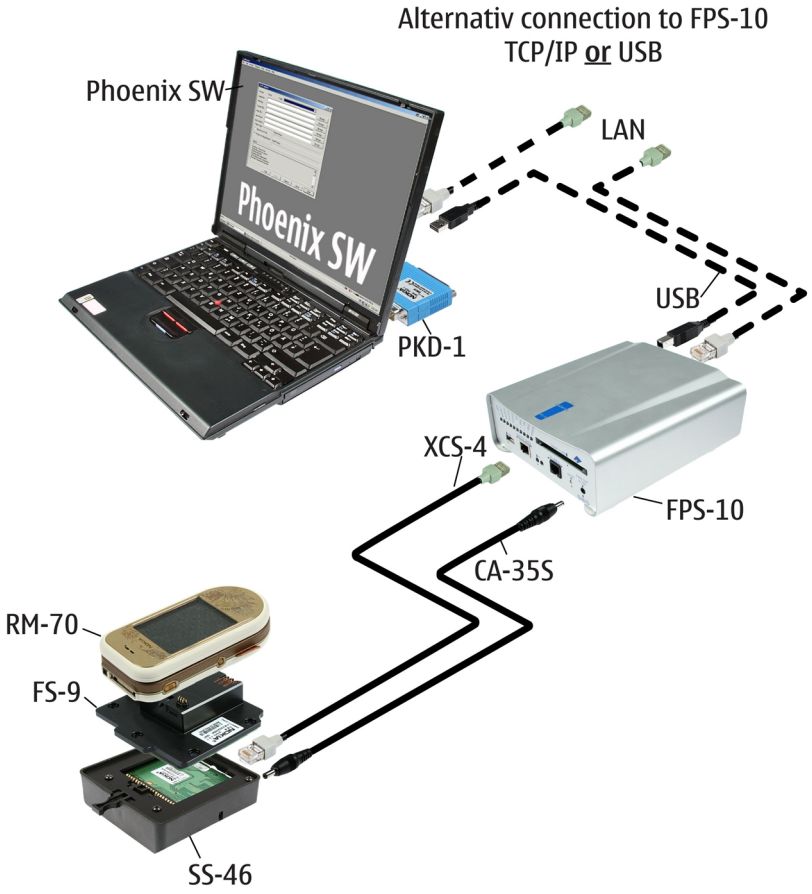

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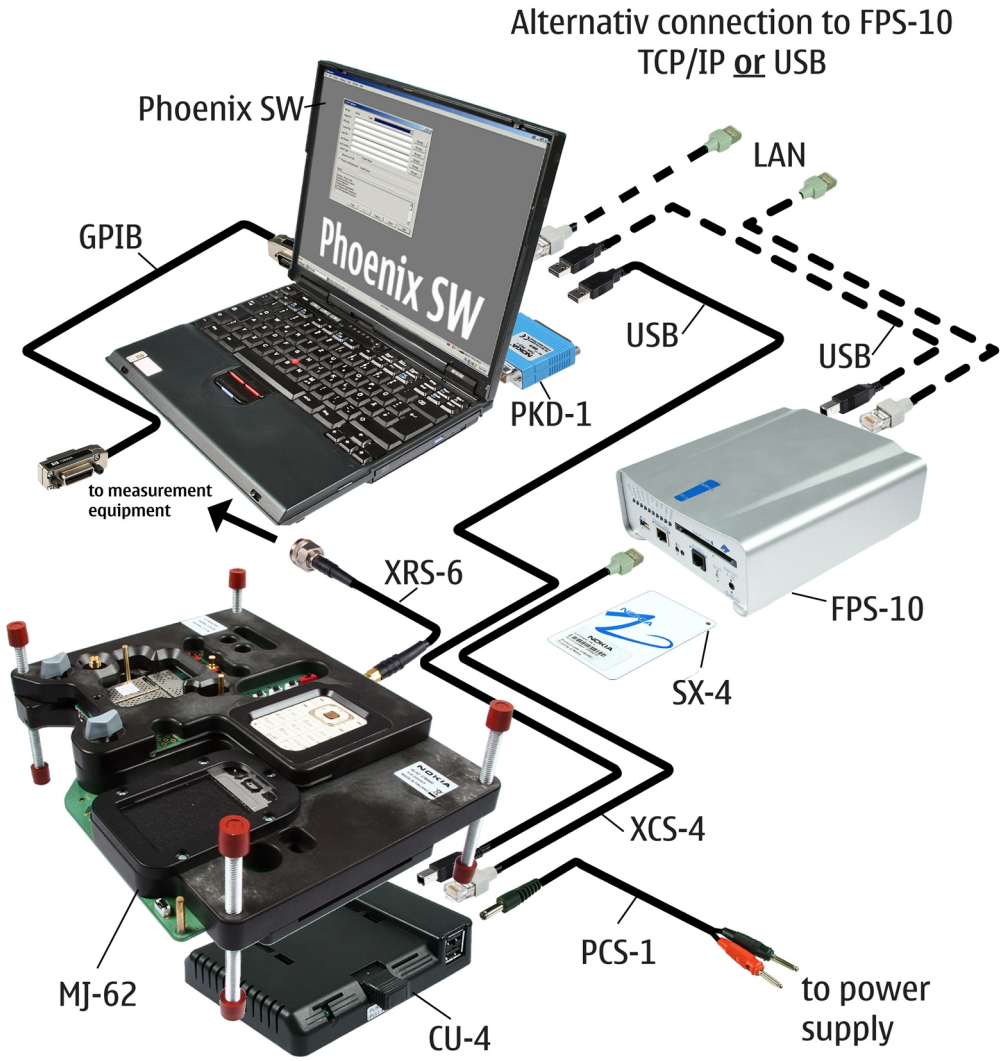
Module jig flash concept with FPS-10



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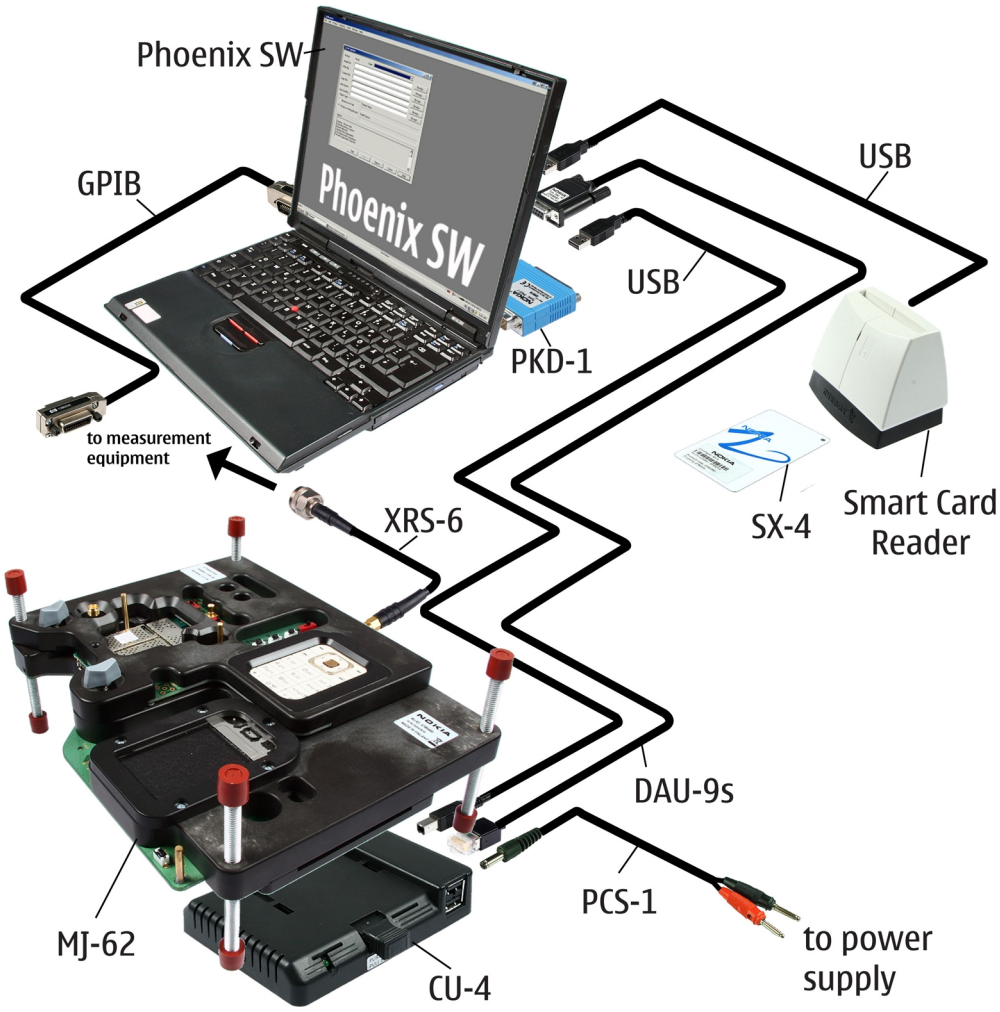
Module jig tuning concept



RF testing and RF/BB tuning concept

Note: Do not connect an ACP-charger to the phone! This may damage the FEM module.

Note: It is important that the FBUS connection (controlled by Phoenix) is active. In case of more or another connection, the phone will not start up when placing it into the jig. In this case, the DAU-9S cable must be disconnected for a couple of seconds, then reconnected and the phone powers up again.

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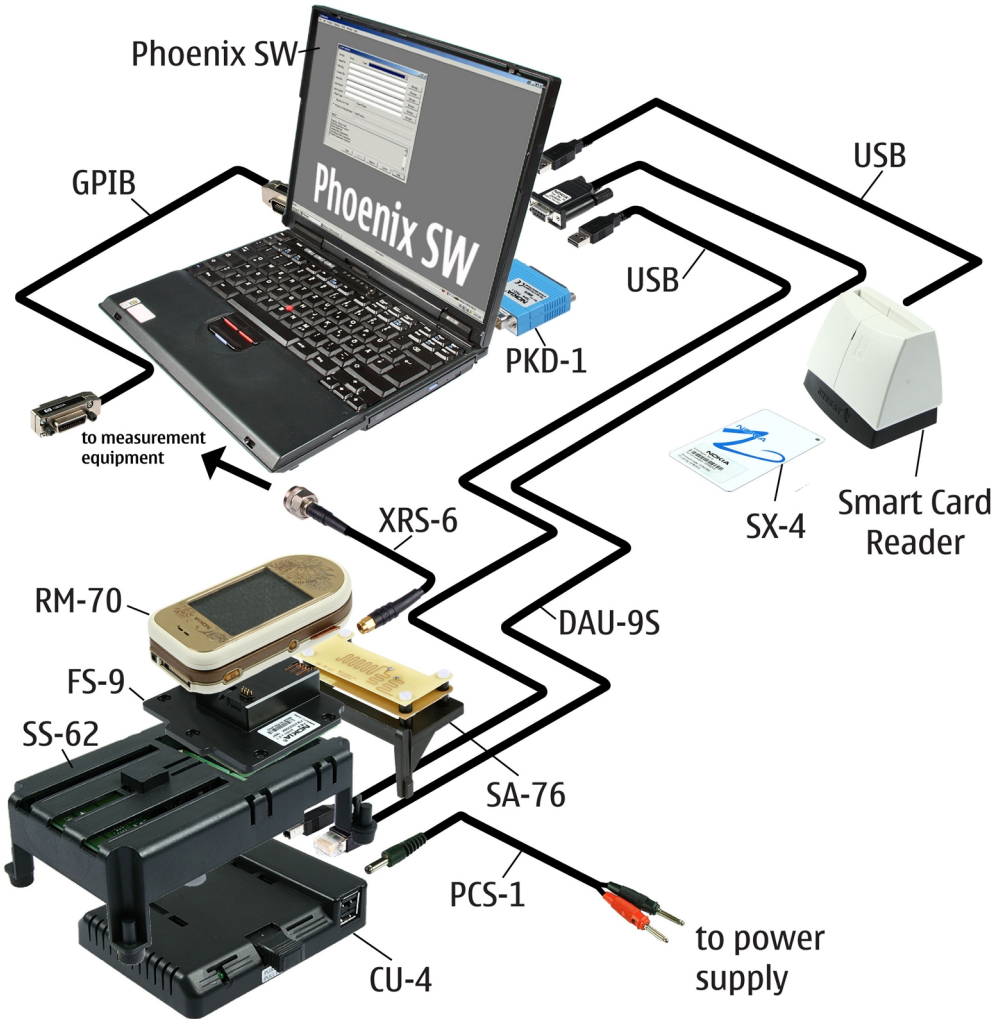

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5 — Disassembly and reassembly instructions

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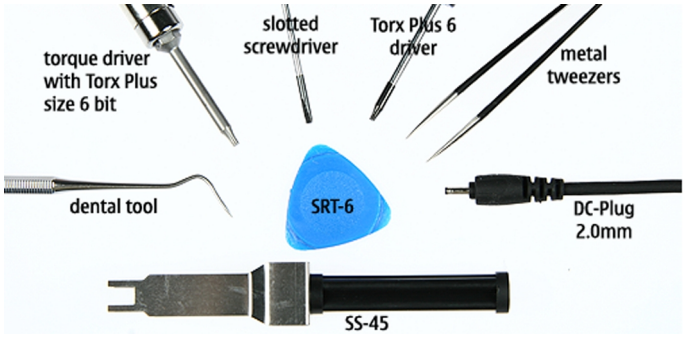
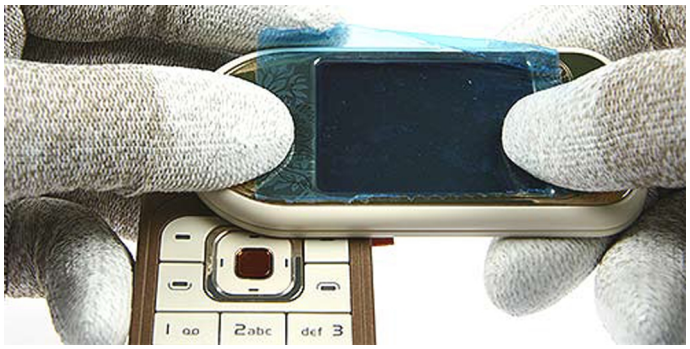
Disassembly instructions (upper block)

Steps

1. You need the following tools.



2. Always protect all windows with a plastic film.



3. Open the **E-COVER** and remove the battery, if it is inserted.

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4. Turn the **UPPER BLOCK** to 90° from the **LOWER BLOCK**. Start opening the **A-COVER ASSY** at the round side with the SRT-6.

5. Slide the SRT-6 around the covers and keep the gap open. Unlock the retaining clips separately.

6. Go ahead near the **SWIVEL** area.

7. This is the last clip to be unlocked.

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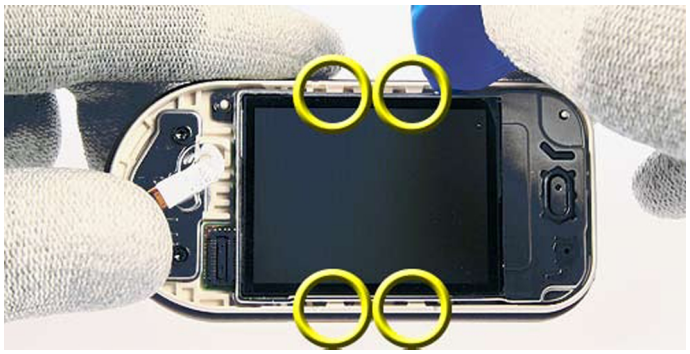
8. Now, separate **A-COVER** and **B-COVER**.

9. Also, protect the inner side of the window with a plastic film.

10. Carefully unlock the **BOARD TO BOARD CONNECTOR**.

11. Unlock four clips at the **B-COVER**, which hold the**UI-SHIELD** into the **B-COVER**.



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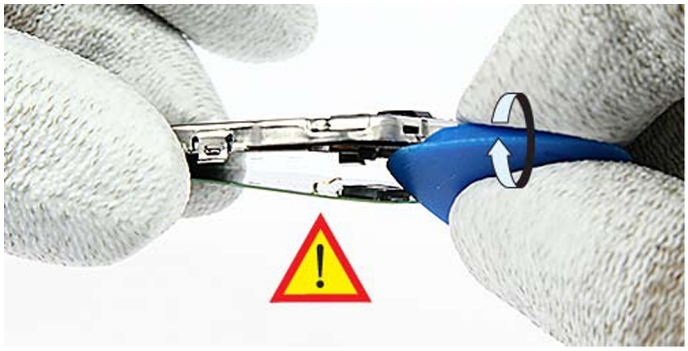
12. Do not damage the LCD connector when opening.



13. Open the four clips which hold the **LCD** into the **UI-SHIELD**. Do not bend the clips too much to keep the part reusable for assembly.

14. Lift out the **LCD**.

15. To avoid dust and scratches, protect the LCD with a plastic film.

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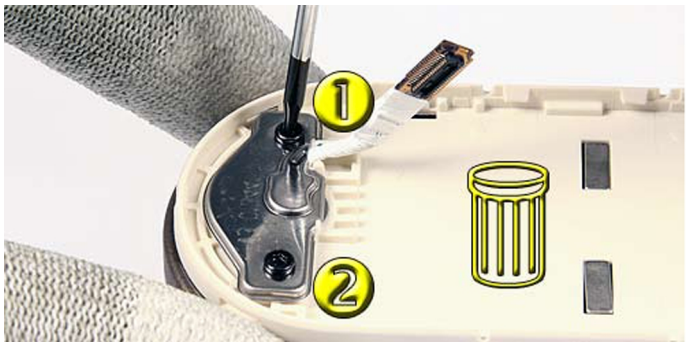
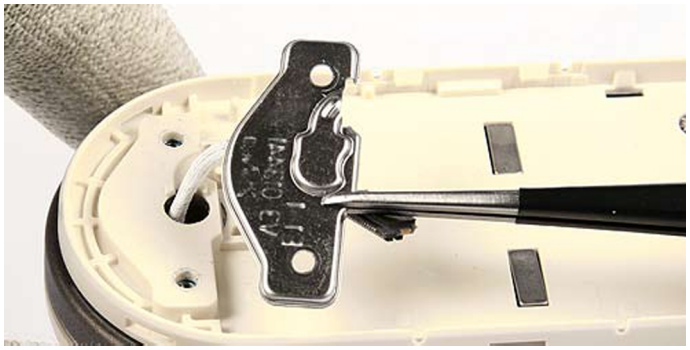
16. Open the two Torx Plus® size 6 screws in the following order.

    Note: For assembly use the reverse order and apply a torque of 25 Ncm +/- 2Ncm. Always use new screws!



17. Remove the **SCREWING PLATE**.



18. Separate the **UPPER BLOCK** from the **LOWER BLOCK**.

Reassembly instructions (upper block)

Steps

1. Follow the disassembly instructions *in reversed order* , from step **18** to step **17**.

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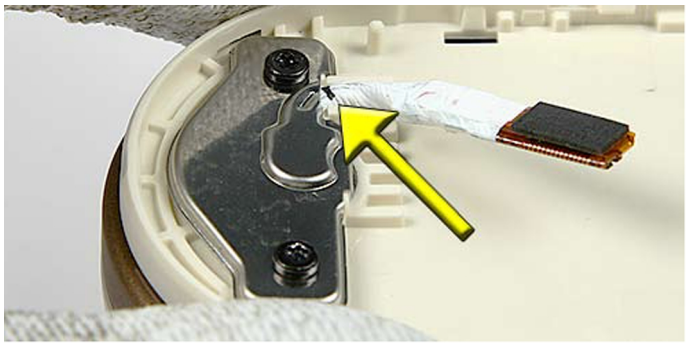
2. Pay attention to the right length of the **COAX CABLE** and place the marking at the edge of the **SCREWING PLATE**.



3. Follow the disassembly instructions *in reversed order* , from step **16** to step **1**.

   Note: Pay special attention to step **16**.

Disassembly instructions (lower block)

Steps

1. Always protect all windows with a plastic film.

2. Remove the **E-COVER**.

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3. If you need to change the **KEYMAT**, it is also possible at a closed **LOWER BLOCK**. Remove the **KEYMAT** starting exactly from the point shown.

4. Open the two Torx Plus® size 6 screw in the following order.

   Note: For assembly use the reverse order and apply a torque of 25 Ncm +/- 2 Ncm.

5. Open the middle snaps of the **D-COVER**, using a slotted screwdriver.

6. Use the SRT-6 to open the snaps of the **D-COVER ASSY** on the right side. Then...

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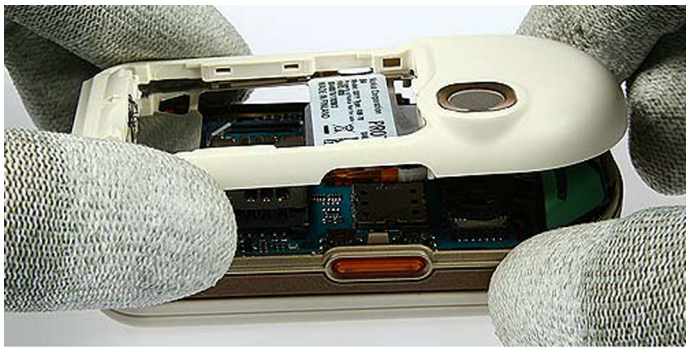
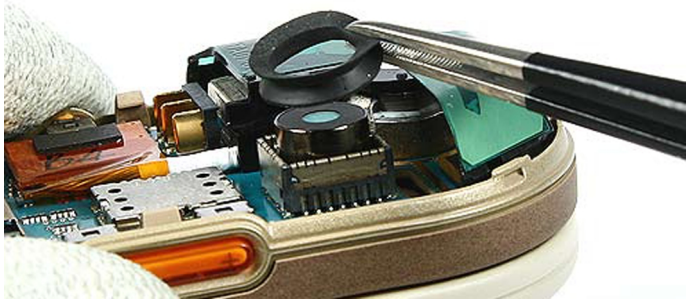
7. ...at the top side and...

8. ...at the left side.

9. Remove the **D-COVER**.



10. Remove the **CAMERA GASKET**.



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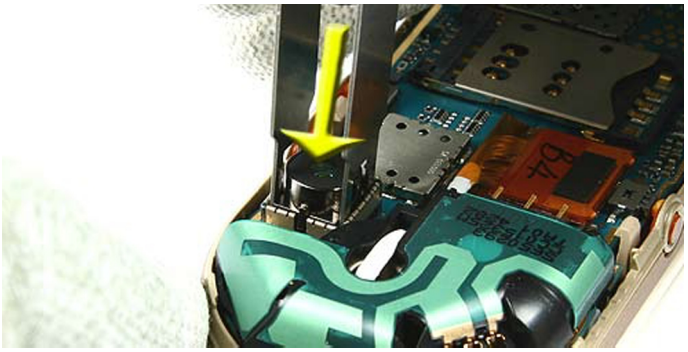
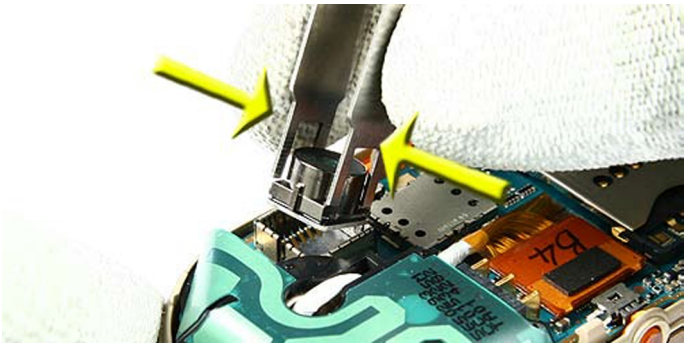
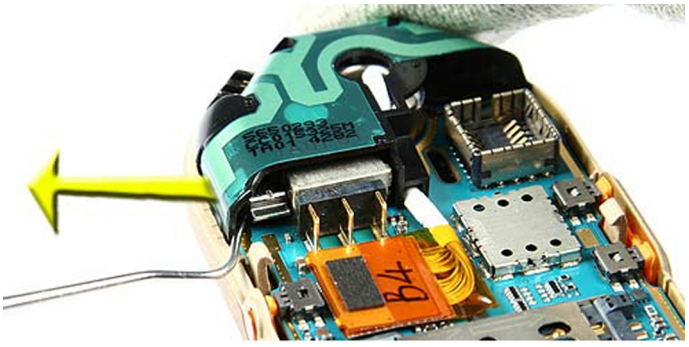
11. Stick the **SS-45** into the camera connector.



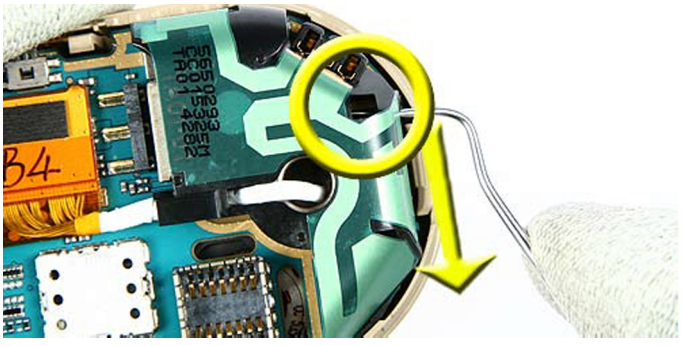
12. Press the SS-45 together and remove the **CAMERA MODULE**.



13. The **ANTENNA MODULE** has four lockings. Use the dental tool to open the first lock.



14. Stick the dental tool under the **ANTENNA MODULE** (The pike of the dental tool is visible in the marked hole). Now pull the tool to the shown direction.



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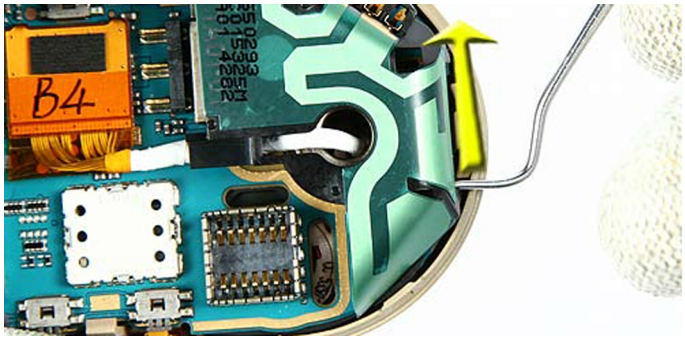
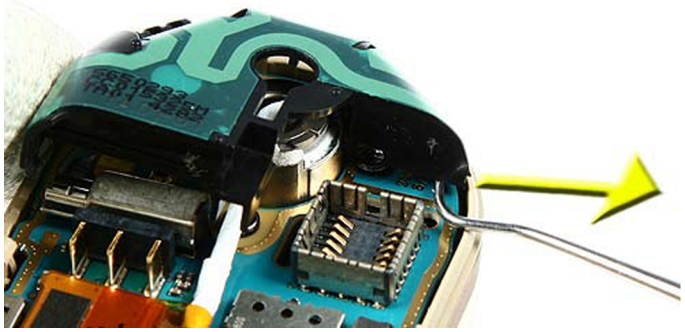
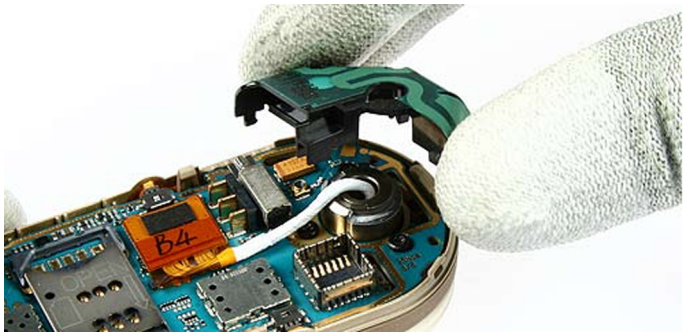
15. Do the same as before (the pike is in this case not visible) and pull in the opposite direction.



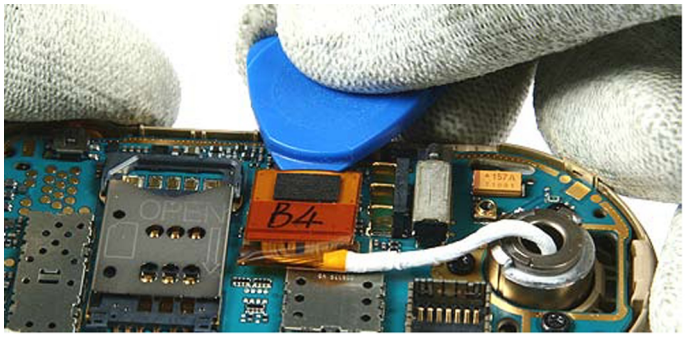
16. Now unlock the last snap.



17. Remove the **ANTENNA MODULE**.



18. Carefully unlock the coax connector with SRT-6.



19. Unsrew the three SWIVEL screws Torx Plus® size 6 in the following order.

Note: For assembly use the reverse order and apply a torque of 25 Ncm +/- 2 Ncm. Always use new screws!

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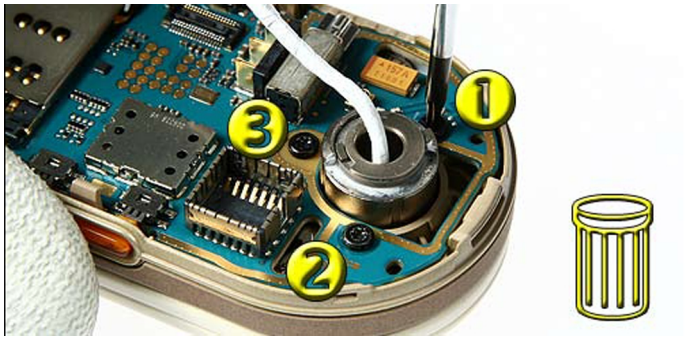
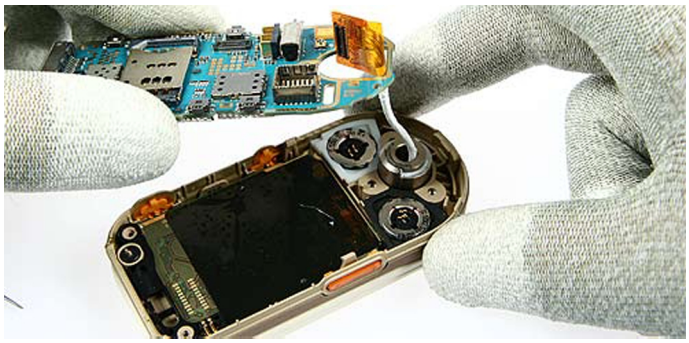
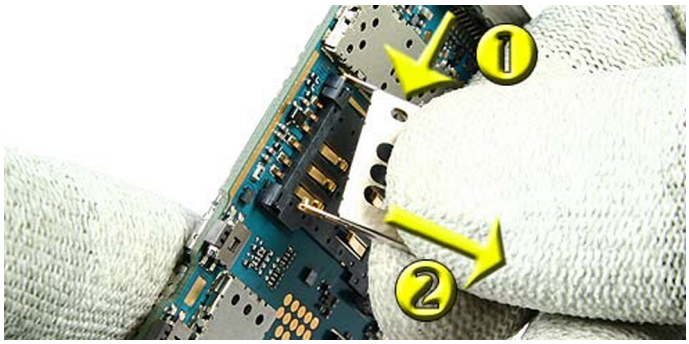


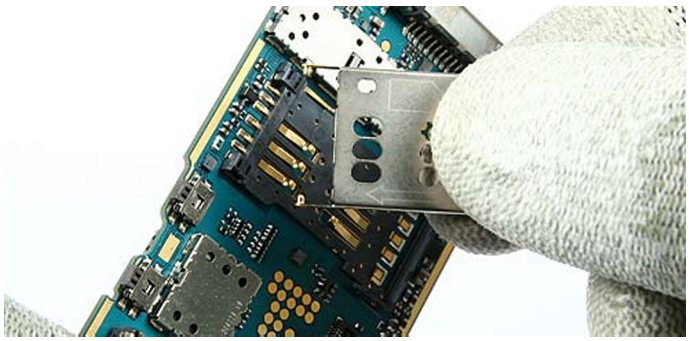
20. Separate the **ENGINE MODULE** from the **C-COVER ASSY**.



21. To remove the **SIM FLAP** start in the order shown.



22. Now remove the other side.



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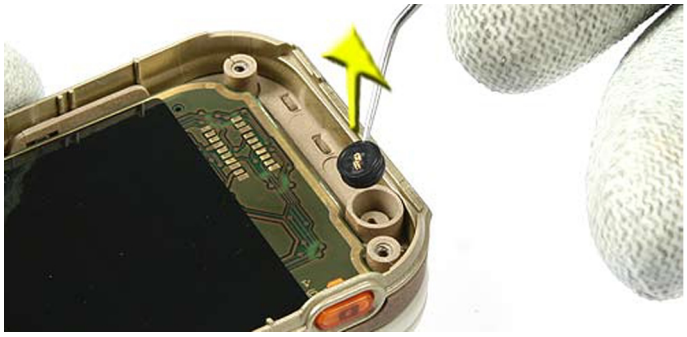
23. Remove the **BLUETOOTH ANTENNA** with tweezers.

24. Remove the **MICROPHONE** with the dental tool.



25. Remove both **IHF SPEAKERS** with tweezers.

26. Separate the **C-COVER ASSY** from the **UPPER BLOCK**.

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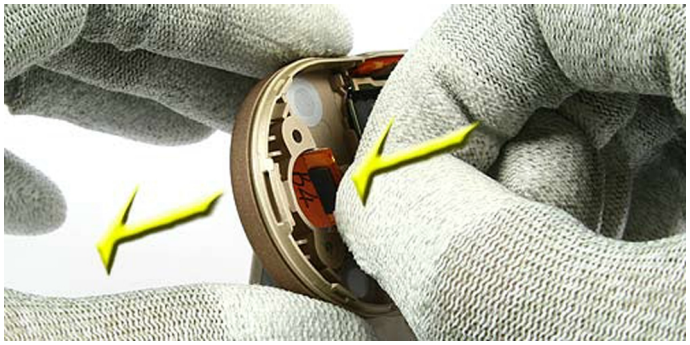
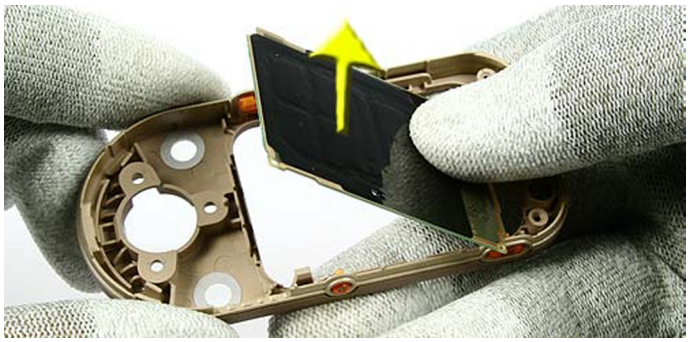
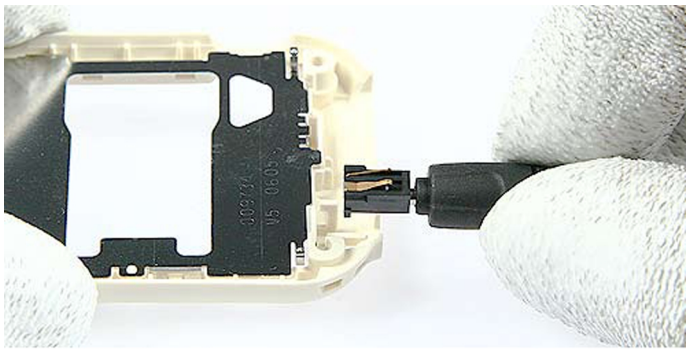
27. Fit the **COAX CABLE** to the hole to remove the **C-COVER ASSY** completely from the **UPPER BLOCK**.



28. Remove the **PWB KEYMAT ASSY**.



29. Use a **DC PLUG** to remove the **DC-JACK**.



30. There are five clips, holding the **LABEL COVER** into the **D-cover**.

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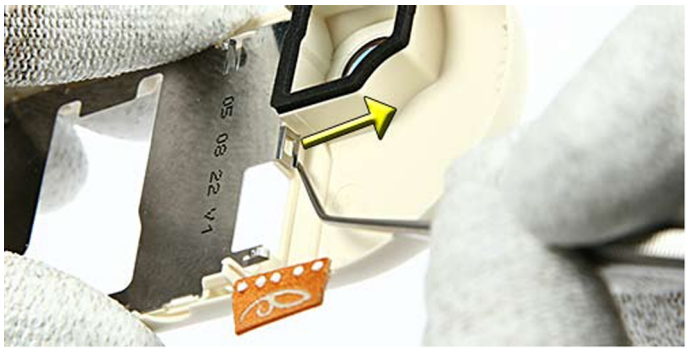
31. Unlock the four clips with a slotted screwdriver.

32. Turn around the **D-COVER** and unlock the last clip.



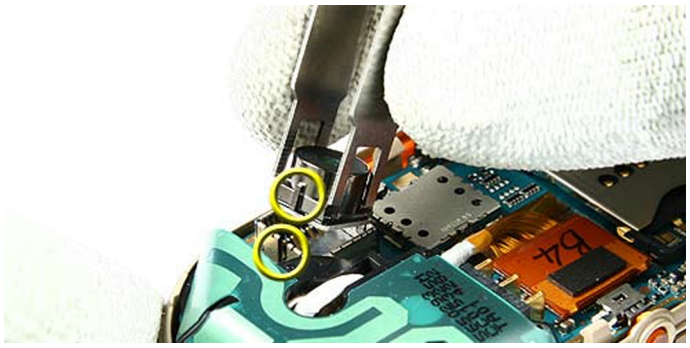
Reassembly instructions (upper block)

Steps

1. Follow the disassembly instructions *in reversed order* , from step **32** to step **13**.

   Note: Pay special attention to step **19**.

2. Mind the correct positioning of the **CAMERA MODULE**.



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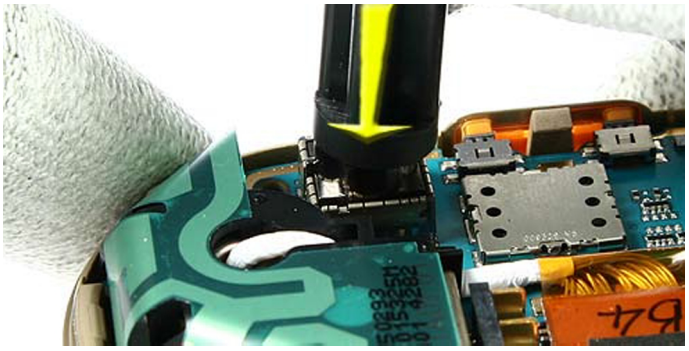
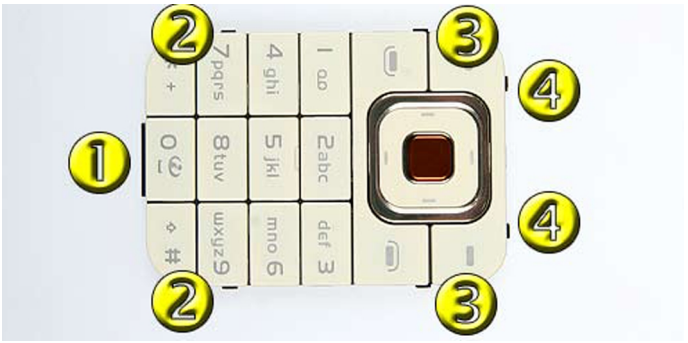
3. Use the opposite side of the SS-45 to lock the **CAMERA MODULE** properly.



4. Follow the disassembly instructions *in reversed order* , from step **12** to step **4**.
5. When assembling, start placing the **KEYMAT** at button "0" and move forward to the upper side.



6. Start placing the **KEYMAT** at the marked positions.

7. Make sure to have all clips locked properly.

8. Follow the disassembly instructions *in reversed order* , from step **3** to step **1**.

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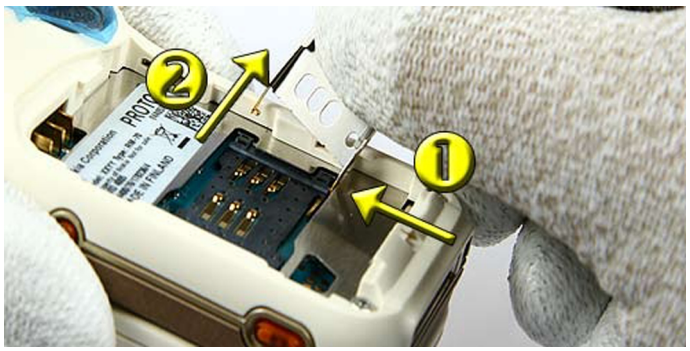
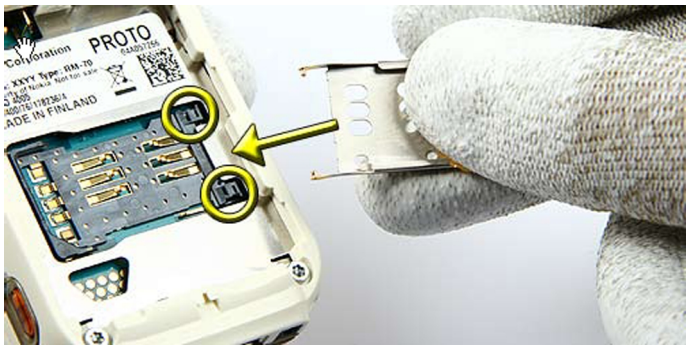
Replacing SIM flap

Steps

1. Change the **SIM FLAP** is also possible without disassembling the **LOWER BLOCK**. Open the **E-COVER**, remove the battery if necessary and follow the shown order.



2. The **SIM CARD READER** and the **SIM FLAP** is provided as one spare part. Separate it and assemble the **SIM FLAP** as shown.



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6 — BB Troubleshooting and Manual Tuning Guide

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Baseband troubleshooting overview

This section is intended to be a guide for localising and repairing electrical faults.

The table below tells you what troubleshooting to go to.

Problem	Troubleshooting
Phone does not stay on or is jammed	1 Dead or jammed phone 2 Power key
Abnormal current consumption	1 General power checking 2 Battery current measuring fault
Flashing does not work or the problem is not clearly defined	1 Flashing 2 Clocking 3 Combo memory
Charging does not work	1 Charging
Display does not work	1 Display fault
Keypad does not work	1 Keypad
Backlights do not work	1 Display and keyboard backlight 2 LED driver
Phone does not read SIM card	1 SIM
USB does not work	1 USB
Audio (mic, earpiece, IHF) does not work	1 Audio 2 Acoustics
Camera does not work	1 Camera hardware failure message 2 Camera baseband hardware 3 Camera viewfinder 4 Bad image quality
Swivel detection	1 Swivel detection troubleshooting
Camera flash LED does not work	1 Flash LED
Bluetooth does not work	1 Bluetooth (BT)
FM radio does not work	1 FM radio

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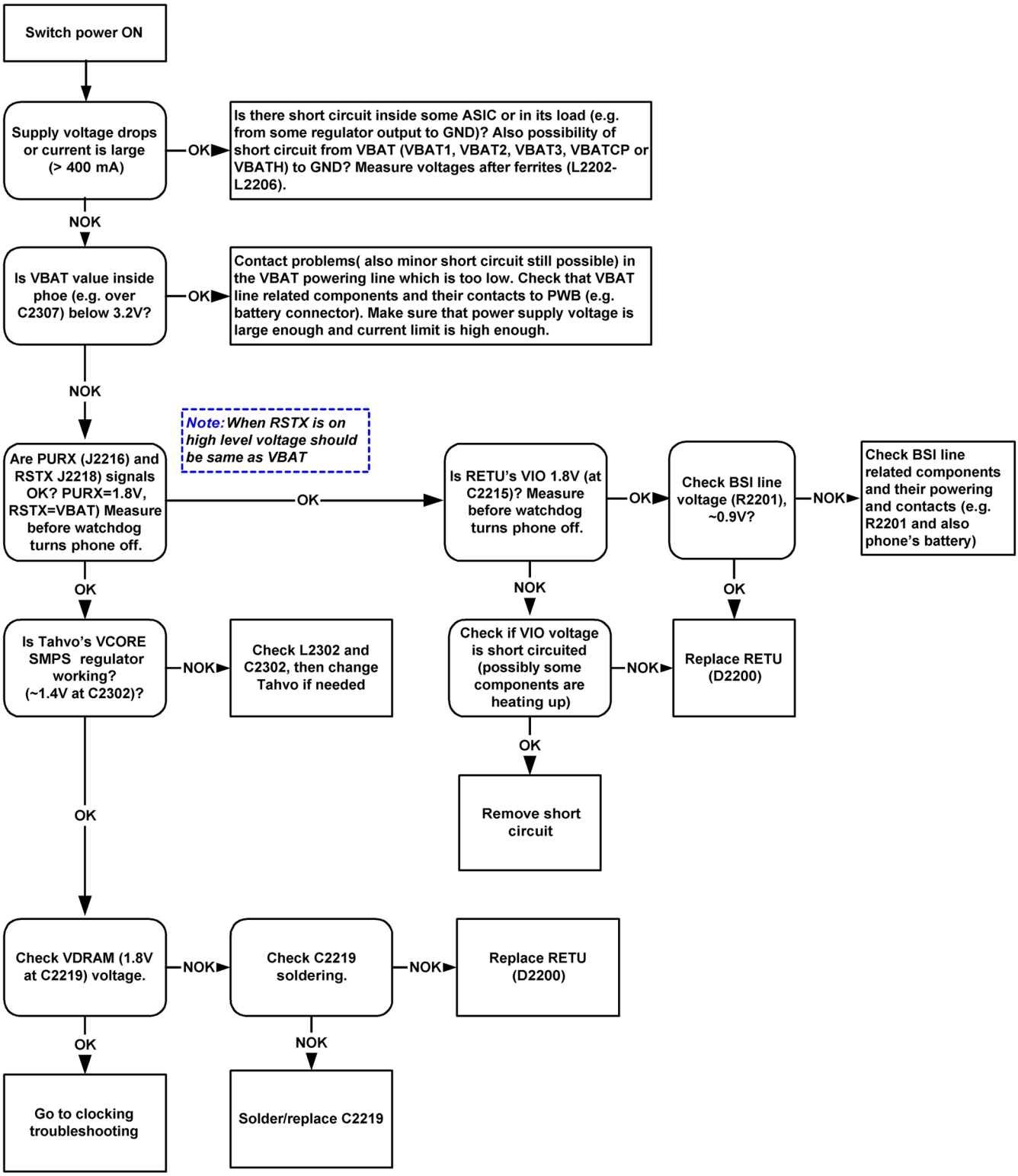
Power and charging troubleshooting

General power checking troubleshooting

Troubleshooting flow



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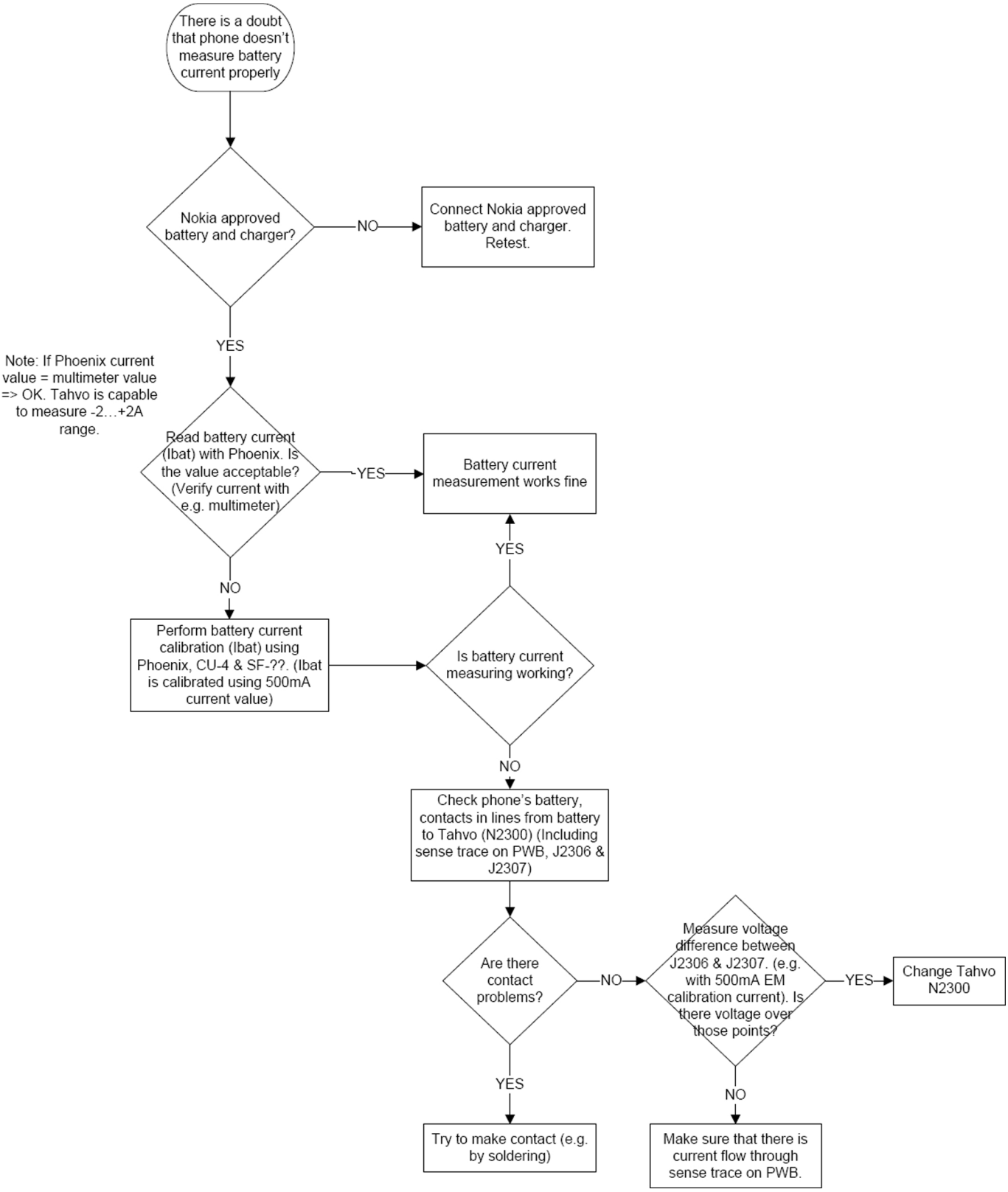
Battery current measuring fault troubleshooting

Troubleshooting flow



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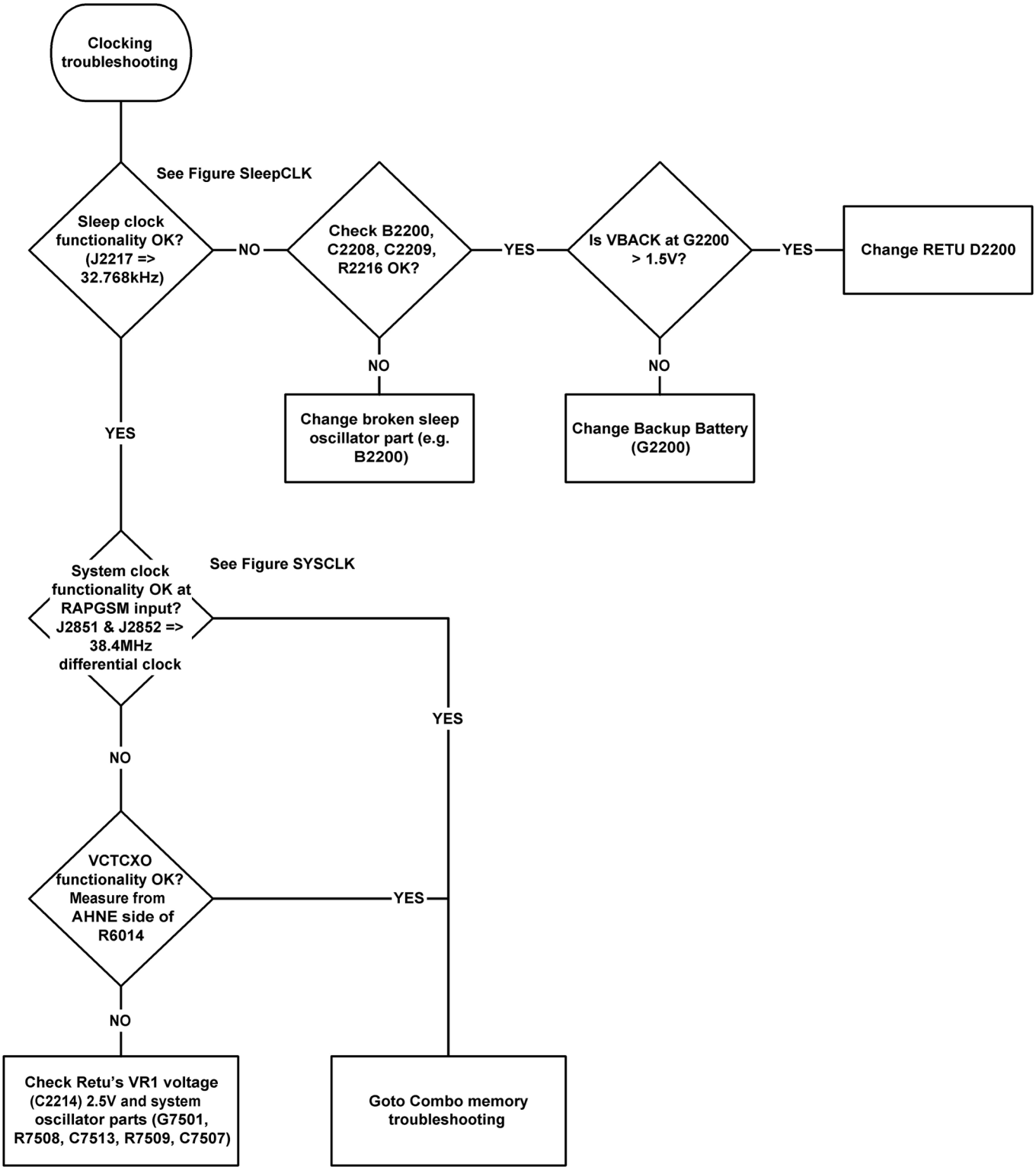
Clocking troubleshooting

Troubleshooting flow



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Interface troubleshooting

Camera failure

Introduction to camera troubleshooting

Bad conditions often cause bad pictures. Therefore, the camera operation has to be checked in constant conditions or by using a second, known-to-be-good Nokia device as reference. Image quality is hard to measure quantitatively, and the difference between a good and a bad picture can be small. Some training or experience may be needed to detect what is actually wrong.

When checking for possible errors in camera functionality, knowing what error is suspected significantly helps the testing by narrowing down the amount of test cases. The following types of image quality problems are common:

- Dust (black spots)
- Lack of sharpness
- Bit errors

Taking and evaluating test pictures

When *taking* a test picture, remember the following:

- Avoid bright fluorescent light, 50/60Hz electrical network or high artificial illumination levels
- If the phone is hot, let it rest for a while before taking the picture
- Make sure the optical system is clean
- Use highest possible resolution
- Make sure the light is suffiecient (bright office lightning)
- Do not take the picture towards light source
- Be as still as possible when taking the picture
- Distance should be at least 40cm, 1-2m is recommended

When *evaluating* a test picture, remember the following:

- The center of the picture is sharper than the edges
- The image may be blurred, though it does not show in the viewfinder
- Analyse the picture from your PC monitor, full colour setting is recommended
- If possible, compare with a picture of the same motive taken with a similar Nokia device

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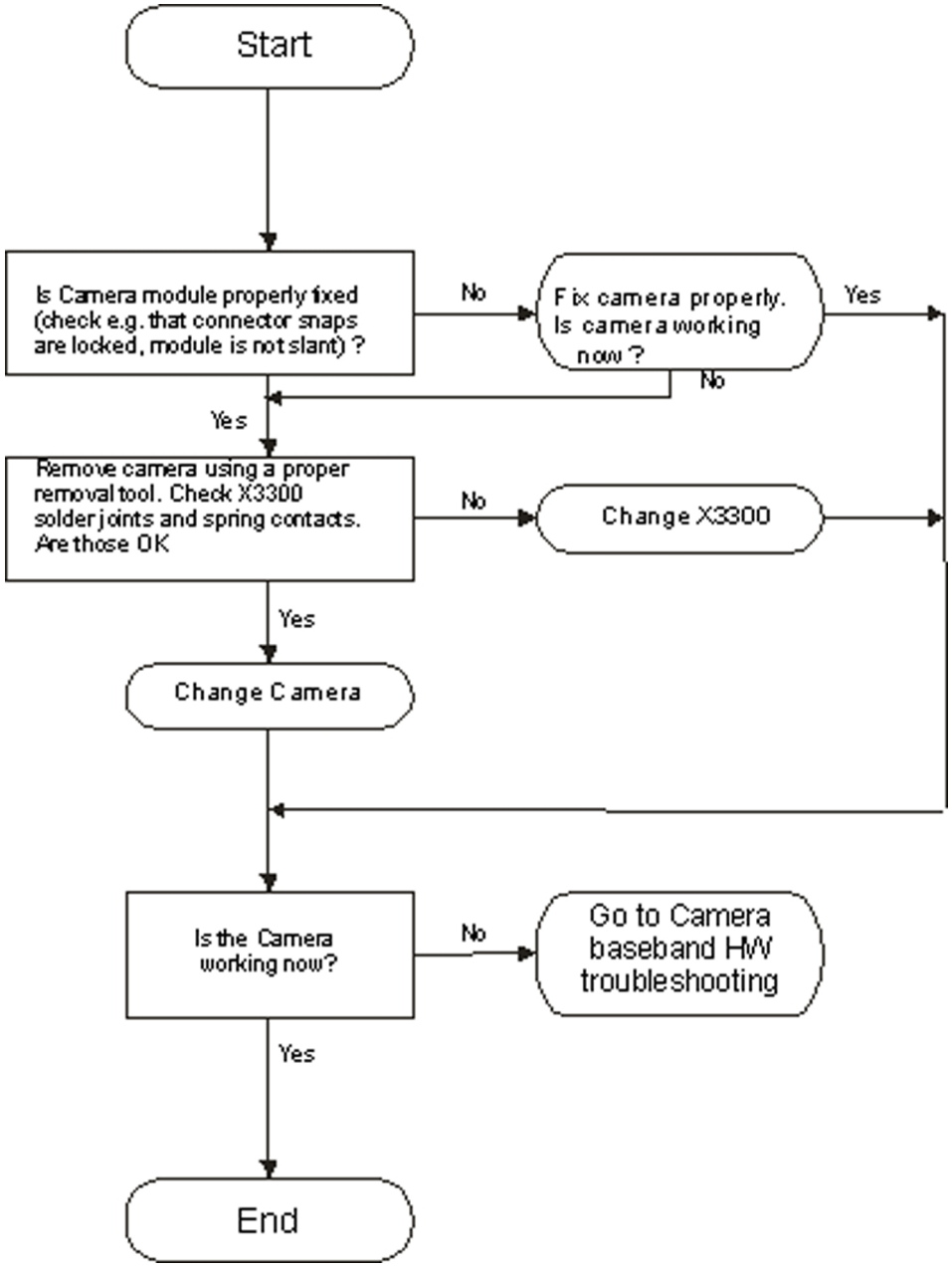
Camera hardware failure message troubleshooting

Troubleshooting flow



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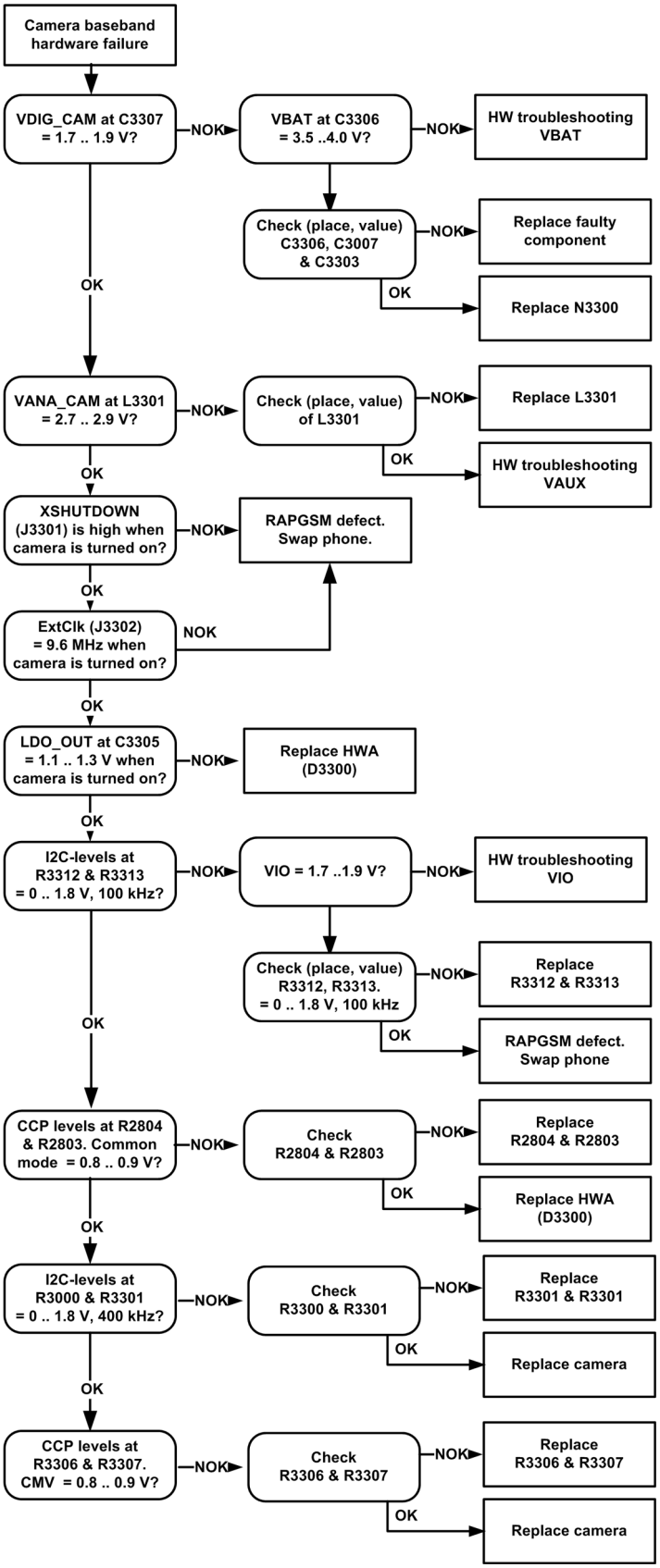
Camera hardware troubleshooting

Camera hardware troubleshooting



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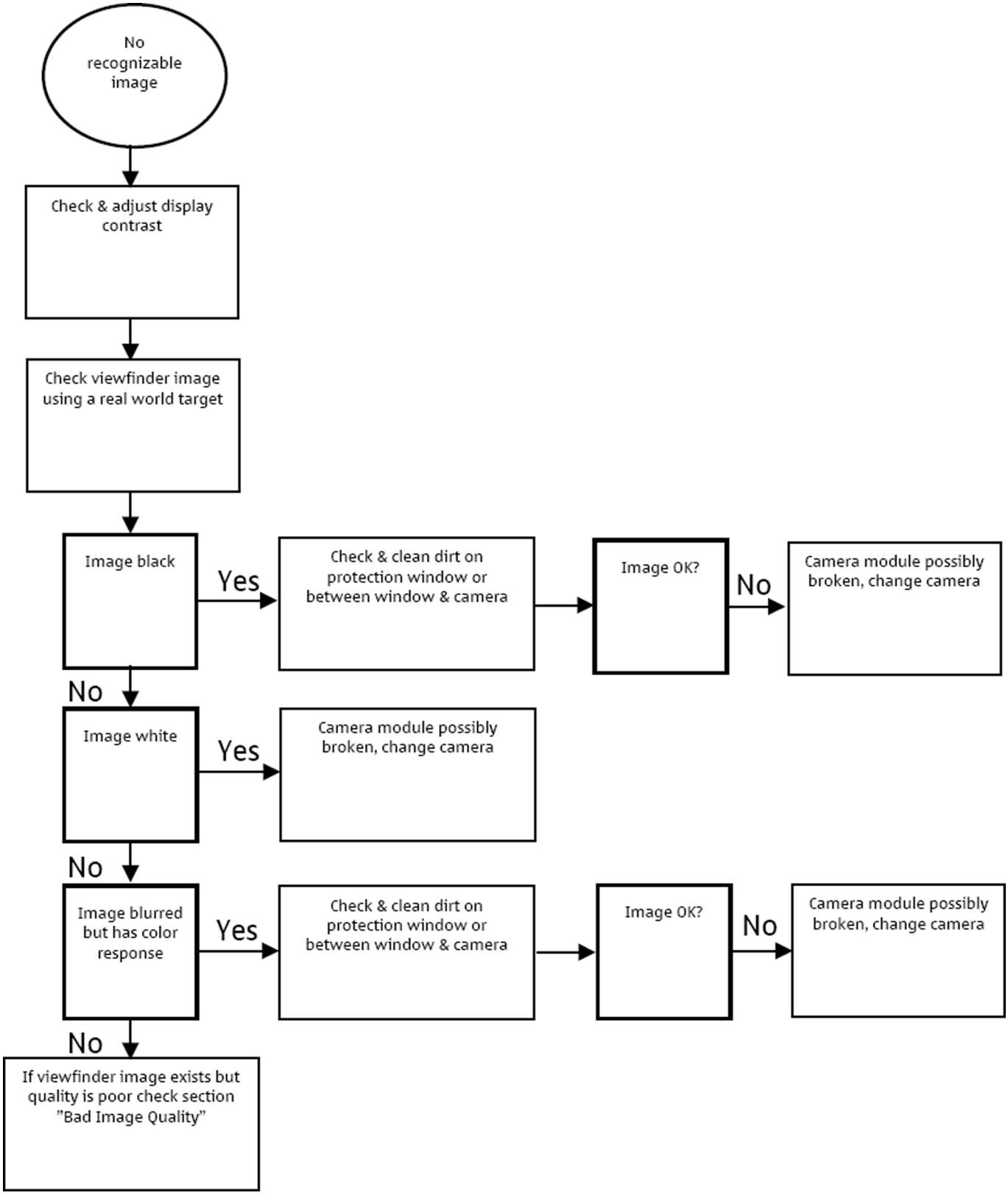
Front camera viewfinder troubleshooting

Troubleshooting flow



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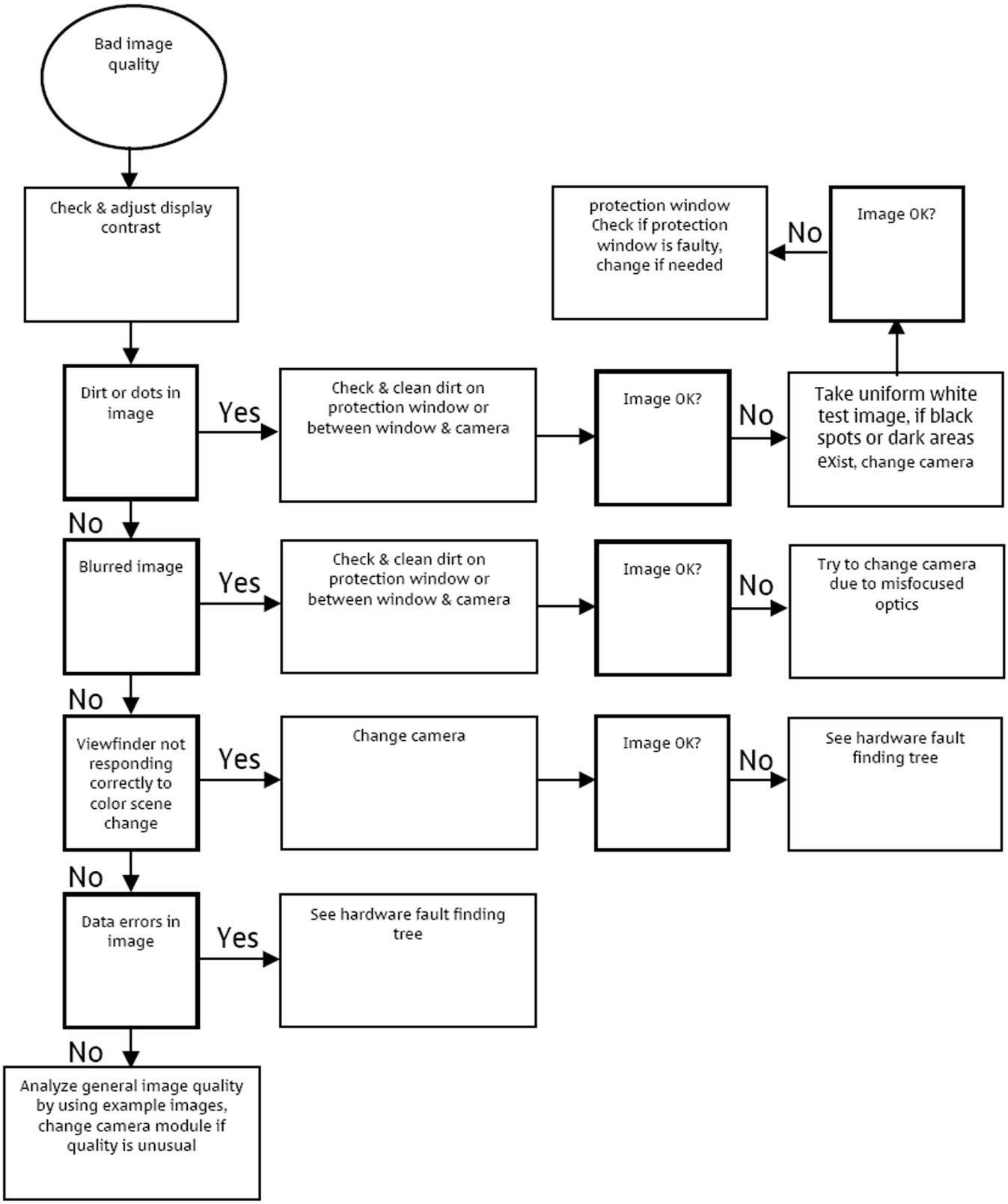
Front camera bad image quality troubleshooting

Troubleshooting flow



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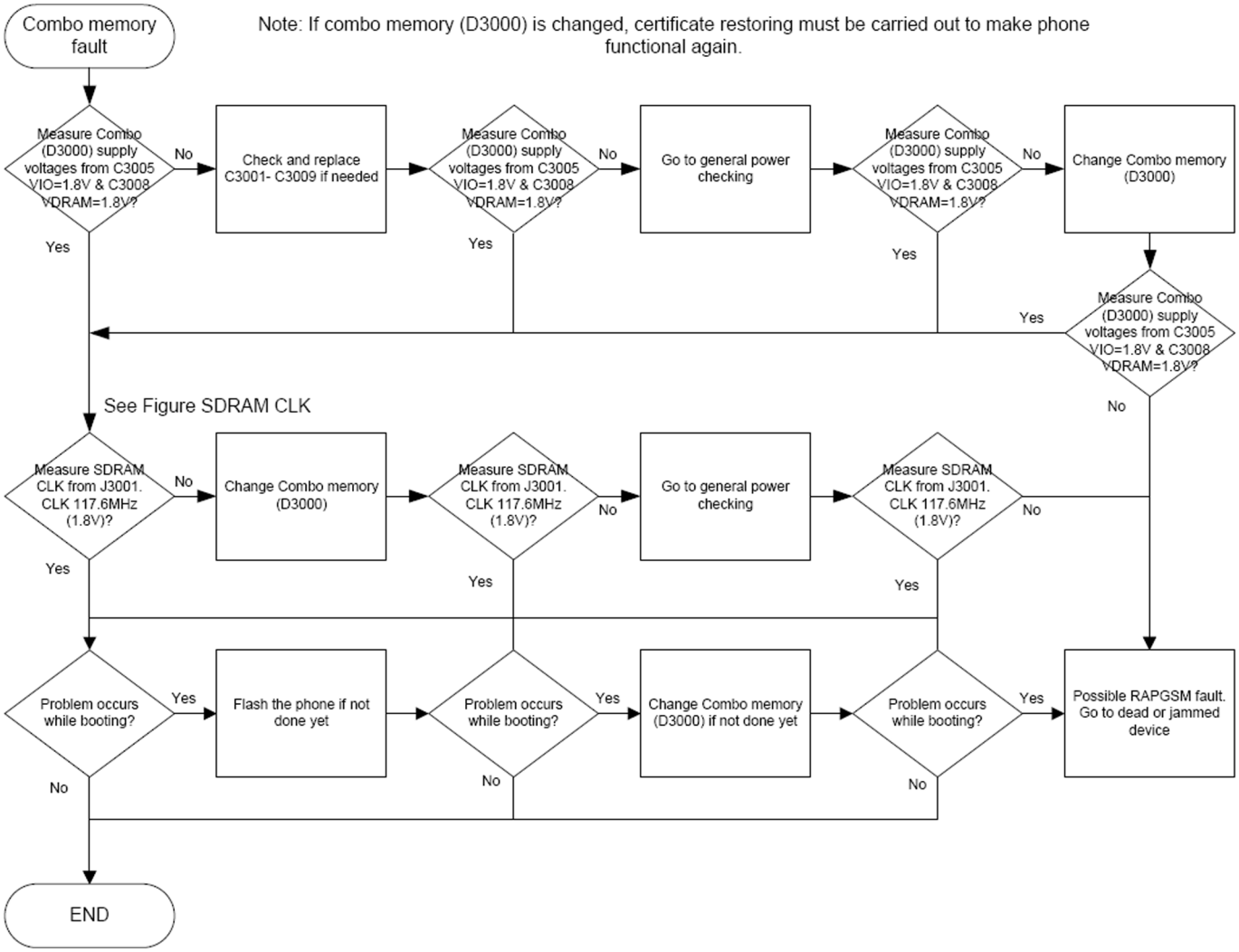
COMBO memory troubleshooting

Troubleshooting flow



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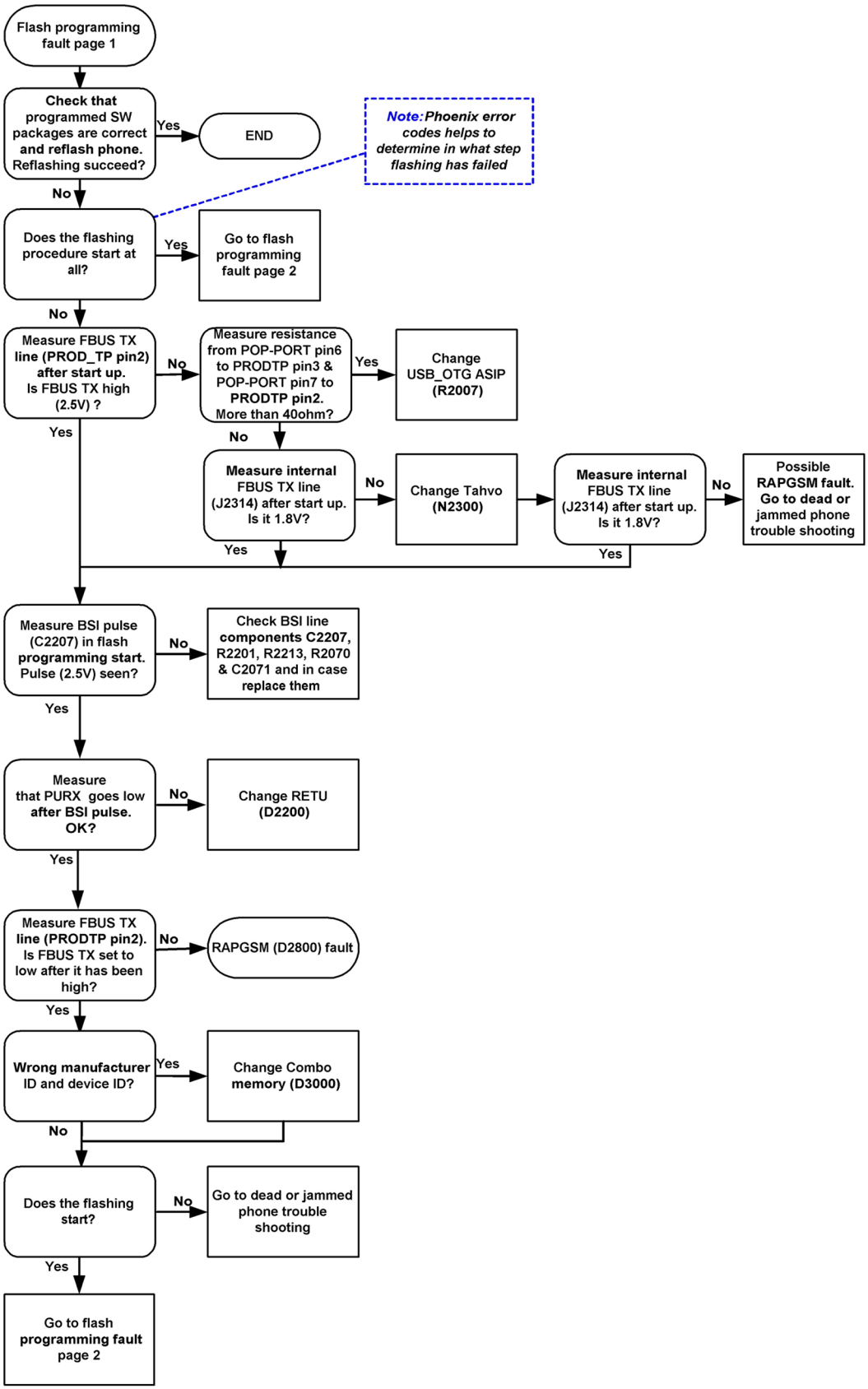
Flash programming fault troubleshooting

Part 1



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Part 2

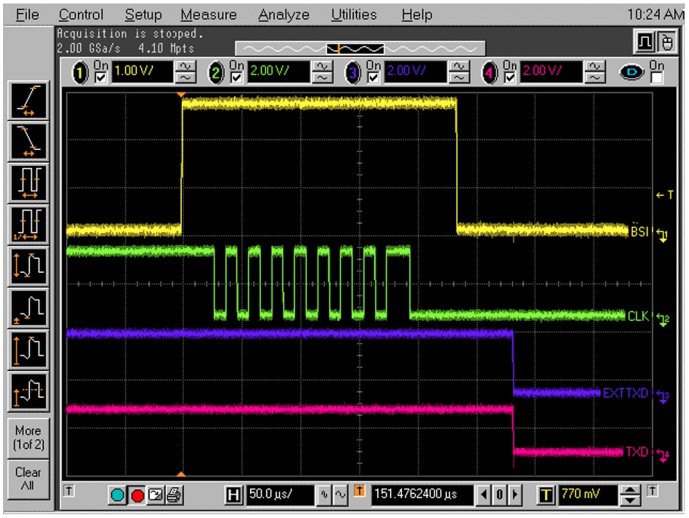

Figure 33 Flashing pic 1. Take single trig measurement for the rise of the BSI signal.

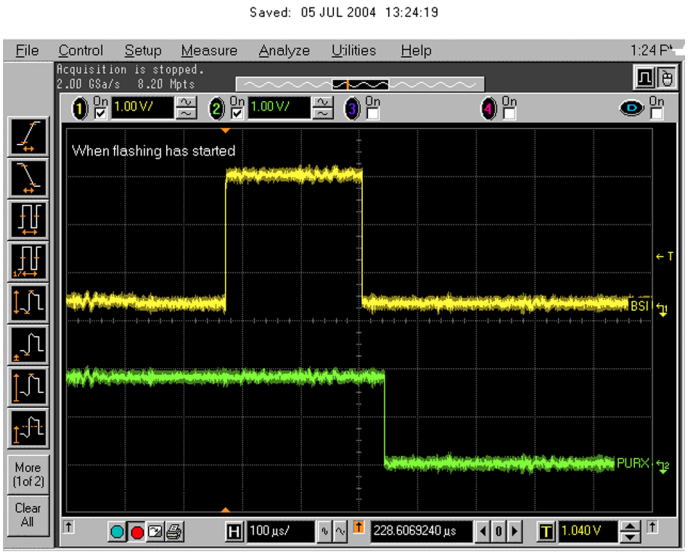

Figure 34 Flashing pic 2. Take single trig measurement for the rise of the BSI signal.

User interface troubleshooting

Display module troubleshooting

General instructions for display troubleshooting

Context

- The display is in a normal mode when the phone is in active use.
- Display is in a partial idle mode when the phone is in the screen saver mode.

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- The operating modes of the display can be controlled with the help of *Phoenix*.

Table 9 Display module troubleshooting cases

Display blank	There is no image on the display. The display looks the same when the phone is on as it does when the phone is off. The backlight can be on in some cases.
Image on the display not correct	Image on the display can be corrupted or a part of the image can be missing. If a part of the image is missing, change the display module. If the image is otherwise corrupted, follow the appropriate troubleshooting diagram.
Backlight dim or not working at all	Backlight LED components are inside the display module. Backlight failure can also be in the connector or in the backlight power source in the main engine of the phone. Backlight is also controlled automatically by the ambient light sensor. This means that in case the display is working (image OK), the backlight is faulty.
Visual defects (pixel)	Pixel defects can be checked by controlling the display with Phoenix. Use both colours, black and white, on a full screen. The display may have some random pixel defects that are acceptable for this type of display. The criteria when pixel defects are regarded as a display failure, resulting in a replacement of the display, are presented the following table.

Table 10 Pixel defects

<table>
<tr><th>Item</th><th colspan="5">White dot defect</th><th>Black dot defect</th><th>Total</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Defect counts</td><td>R</td><td>G</td><td>B</td><td>White Dot Total</td><td rowspan="2">1</td><td rowspan="2">1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>2</td><td>Combined defect counts</td><td colspan="6">Not allowed.
Two single dot defects that are within 5 mm of each other should be interpreted as combined dot defect.</td></tr>
</table>

Steps

1. Verify with a working display that the fault is not on the display module itself.
   The display module cannot be repaired.
2. Check that the cellular engine is working normally.
   i To check the functionality, connect the phone to a docking station.
   ii Start *Phoenix* service software.

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iii Read the phone information to check that also the application engine is functioning normally (you should be able to read the APE ID).

3. Proceed to the display troubleshooting flowcharts.

   Use the **Display Test** tool in *Phoenix* to find the detailed fault mode.

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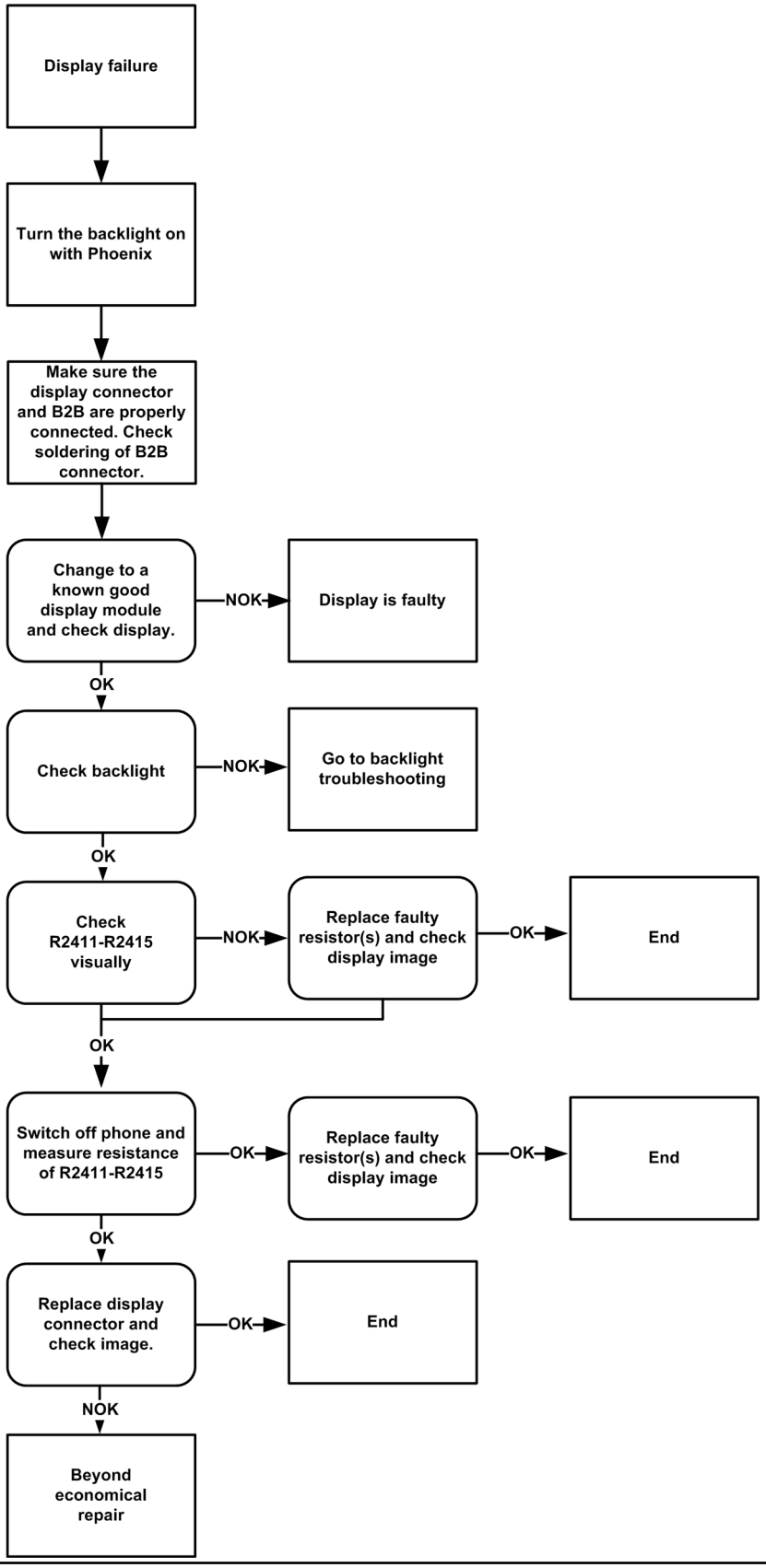
Display troubleshooting

Troubleshooting flow



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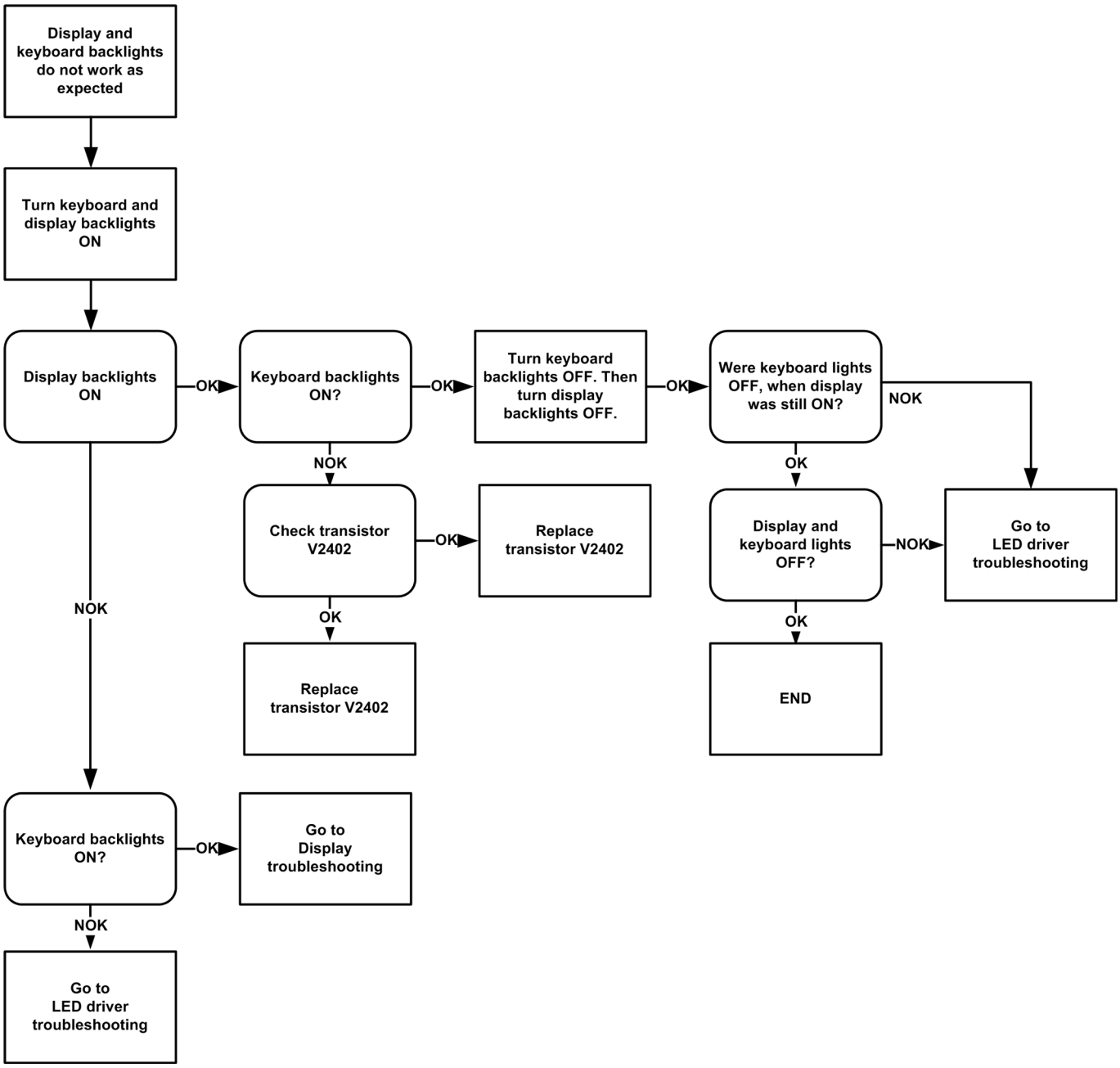
Backlight troubleshooting

Context

The device has one LED driver that provides current for both display and keyboard backlights. Brightness can be adjusted manually. It affects both display and keypad. Keyboard backlights can be turned ON/OFF separately but not without switching on the display lights.

Display and keyboard backlight troubleshooting



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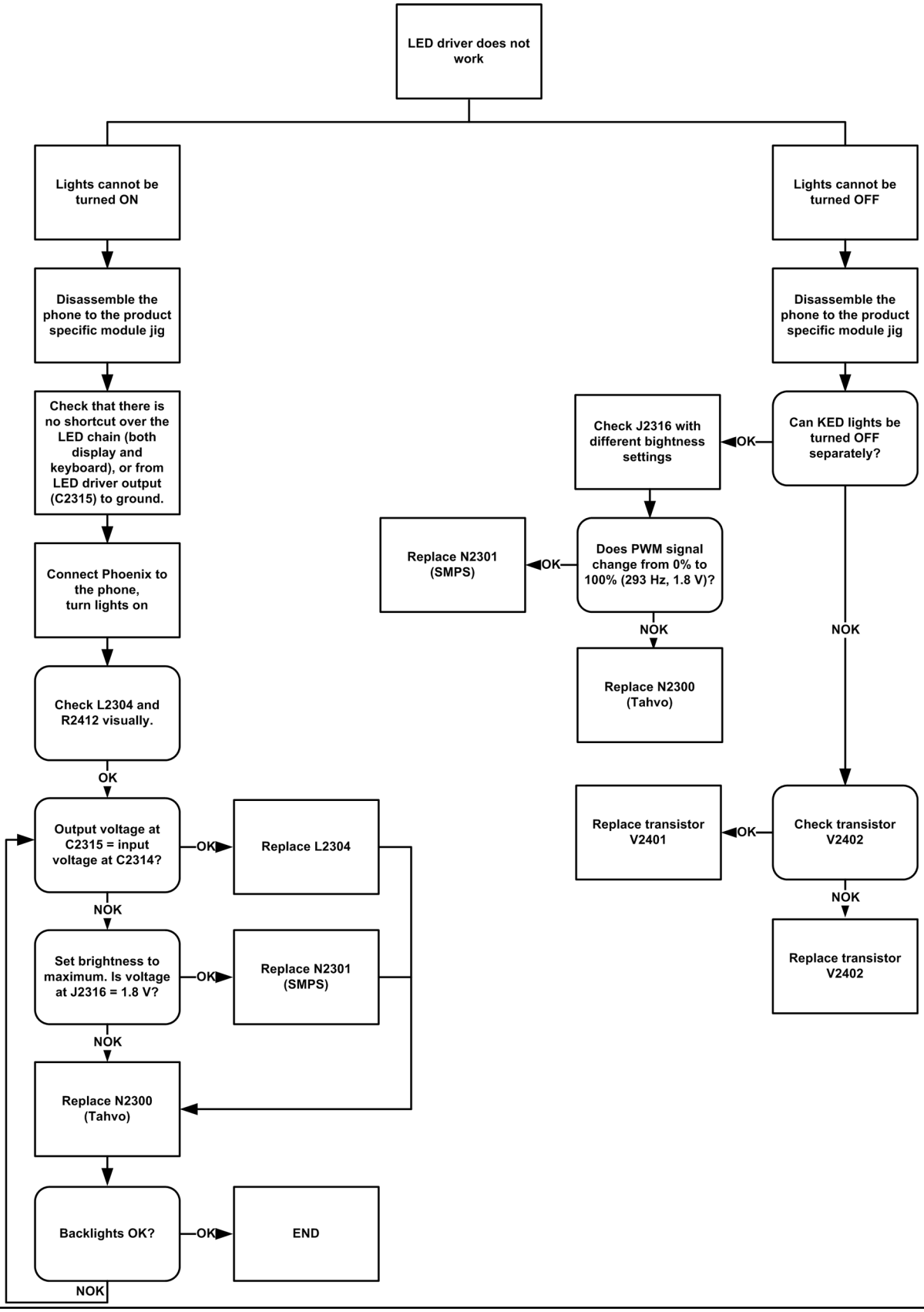
LED driver troubleshooting

LED driver troubleshooting



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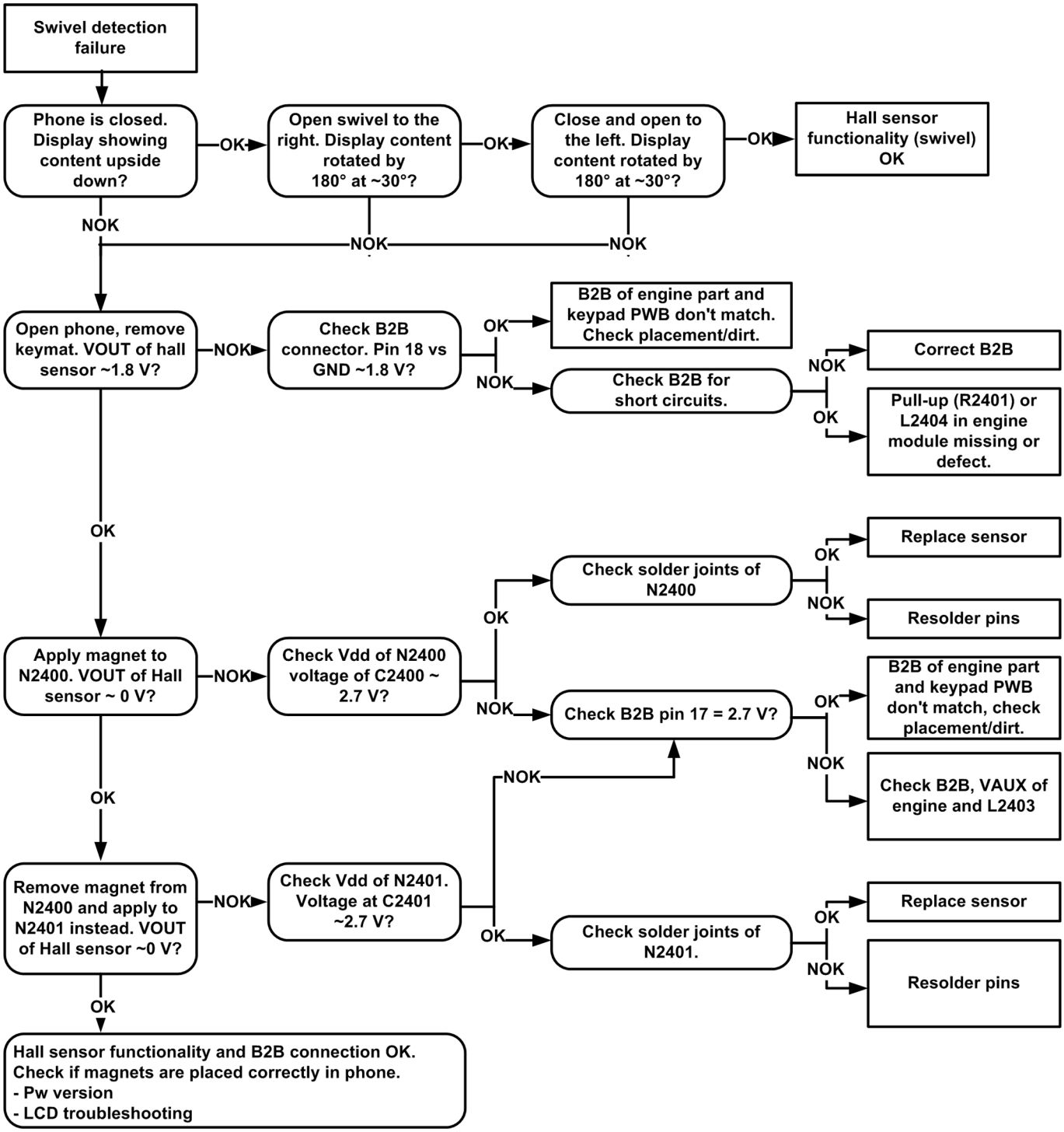
Swivel detection troubleshooting

Swivel detection troubleshooting



Audio troubleshooting

Audio troubleshooting test instructions

Differential external earpiece and internal earpiece outputs can be measured either with a single-ended or a differential probe.

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When measuring with a single-ended probe each output is measured against the ground.

Internal handsfree output is measured using a current probe, if a special low-pass filter designed for measuring a digital amplifier is not available. Note also that when using a current probe, the input signal frequency must be set to 2kHz.

The input signal for each loop test can be either single-ended or differential.

Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Function generator (sine waveform)
- Current probe (Internal handsfree PWM output measurement)
- Phoenix service software
- Battery voltage 3.7V

Test procedure

Audio can be tested using the Phoenix audio routings option. Three different audio loop paths can be activated:

- External microphone to Internal earpiece
- External microphone to Internal handsfree speaker
- Internal microphone to External earpiece

Each audio loop sets routing from the specified input to the specified output enabling a quick in-out test. Loop path gains are fixed and they cannot be changed using Phoenix. Correct pins and signals for each test are presented in the following table.

Phoenix audio loop tests and test results

The results presented in the table apply when no accessory is connected and battery voltage is set to 3.7V.

Earpiece, internal microphone and speaker are in place during measurement. Applying a headset accessory during measurement causes a significant drop in measured quantities.

The gain values presented in the table apply for a differential output vs. single-ended/differential input.

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Loop test	Input terminal	Output terminal	Path gain [dB] (fixed)	Input voltage [mVp-p]	Differential output voltage [mVp-p]	Output DC level [V]	Output current [mA]
External Mic to External Earpiece	XMICP and GND	HSEAR R P, HSEAR R N and GND	-2.9	1000	720	1.2	NA
		HSEAR P, HSEAR N and GND					
	XMICN and GND	HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					
External Mic to Internal Earpiece	XMICP and GND	EarP and GND	-4.5	1000	600	1.2	NA
		EarN and GND					
	XMICN and GND	EarP and GND					
		EarN and GND					
External Mic to Internal handsfree	XMICP and GND	B2102 pads	-5	1000	560	0	25mA (calc.)
	XMICN and GND	B2102 pads					
Internal Mic to External Earpiece	B2100 (OUT/ GND)	HSEAR R P, HSEAR R N and GND	22.7	100	1360	1.2	NA
		HSEAR P, HSEAR N and GND					
		HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					

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Measurement data

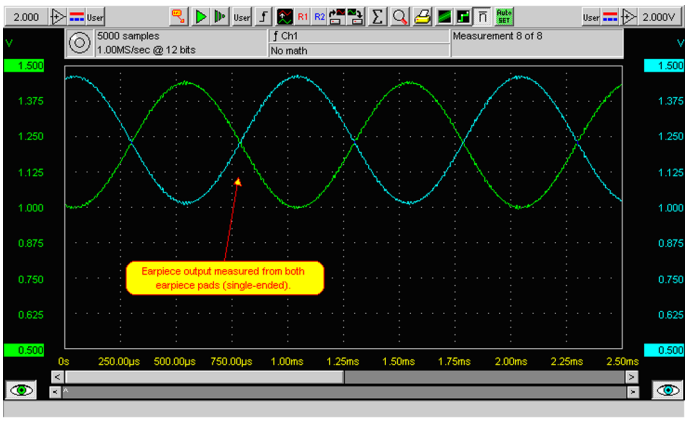

Figure 35 Single-ended output waveform of the Ext_in_HP_out measurement when earpiece is connected.

Figure 36 Differential output waveform of the Ext_in_IHF_out out loop measurement when speaker is connected.

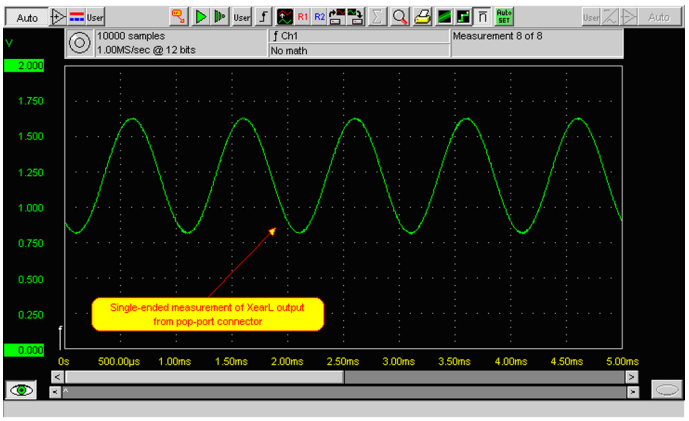

Figure 37 Single-ended output waveform of the HP_in_Ext_out loop when microphone is connected.

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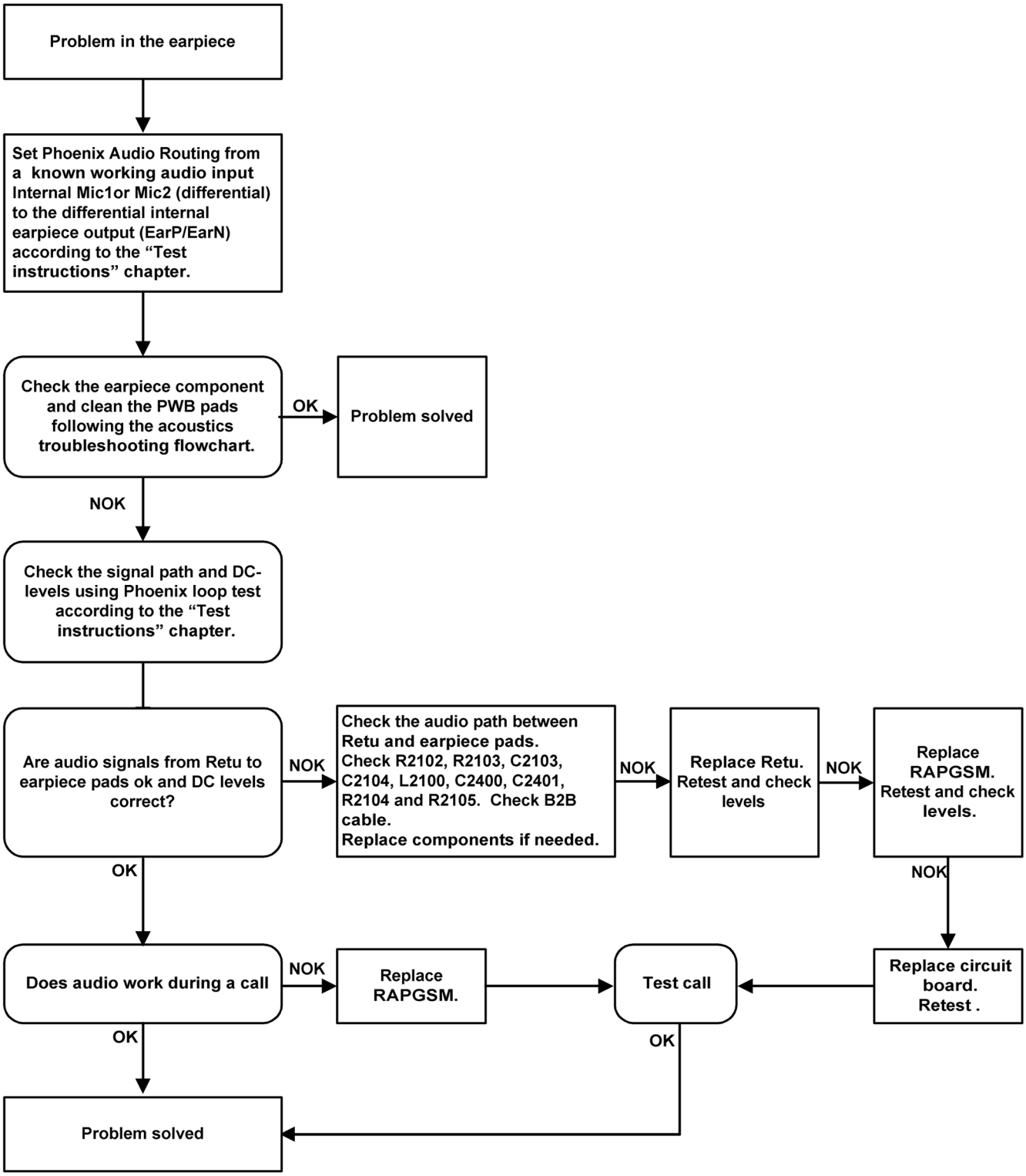
Internal earpiece troubleshooting

Troubleshooting flow



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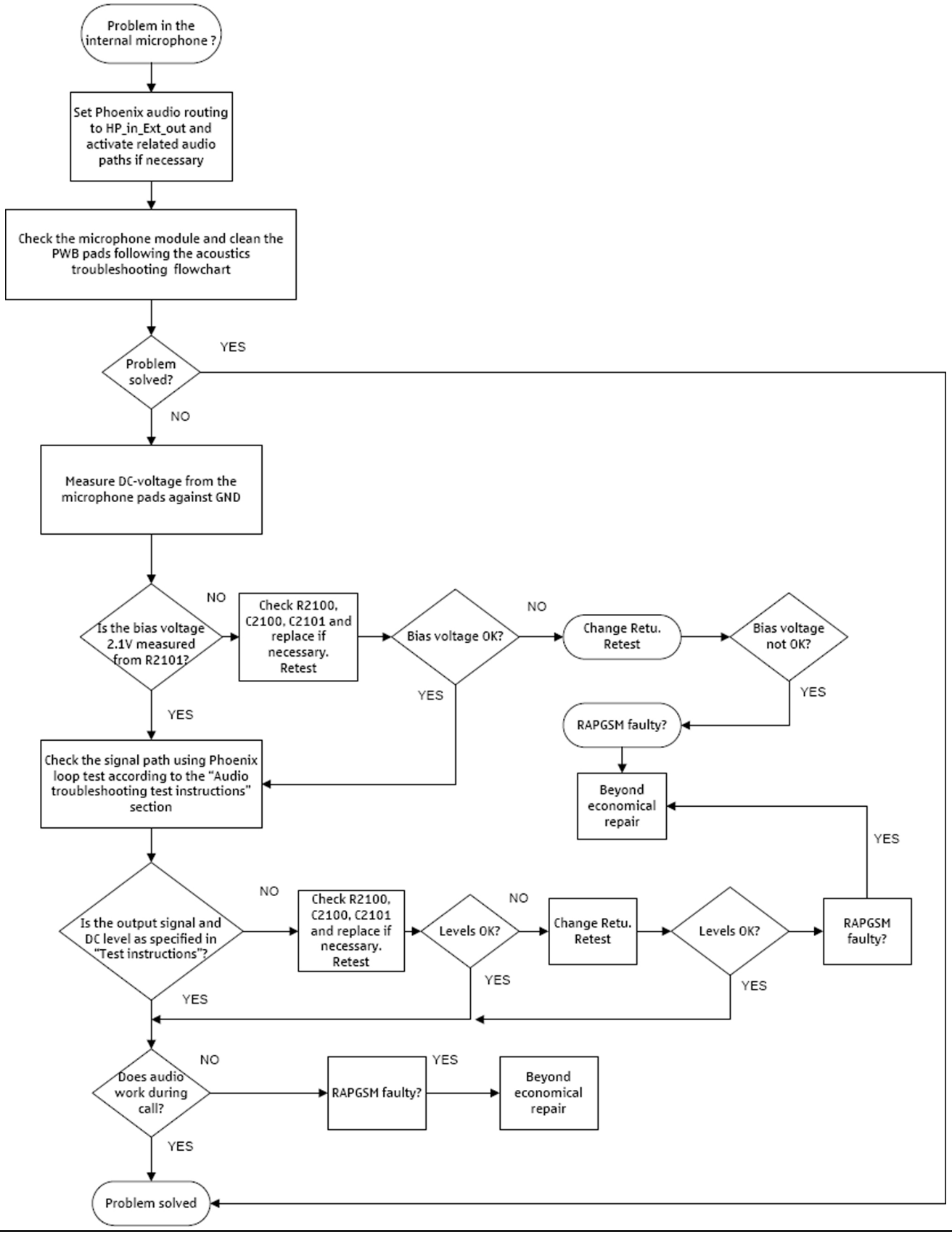
Internal microphone troubleshooting

Troubleshooting flow



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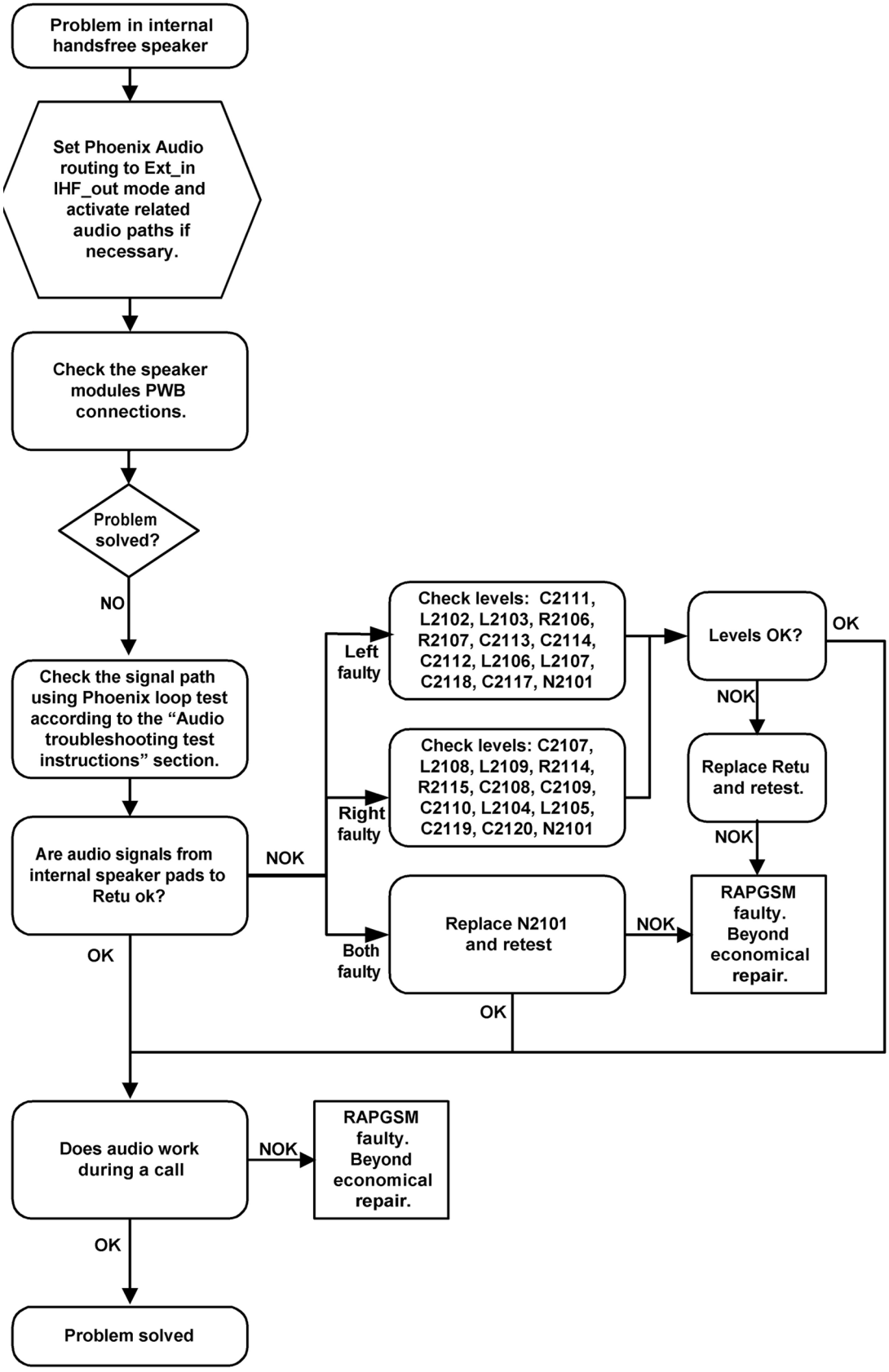
IHF troubleshooting

Troubleshooting flow



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External microphone troubleshooting

Troubleshooting flow

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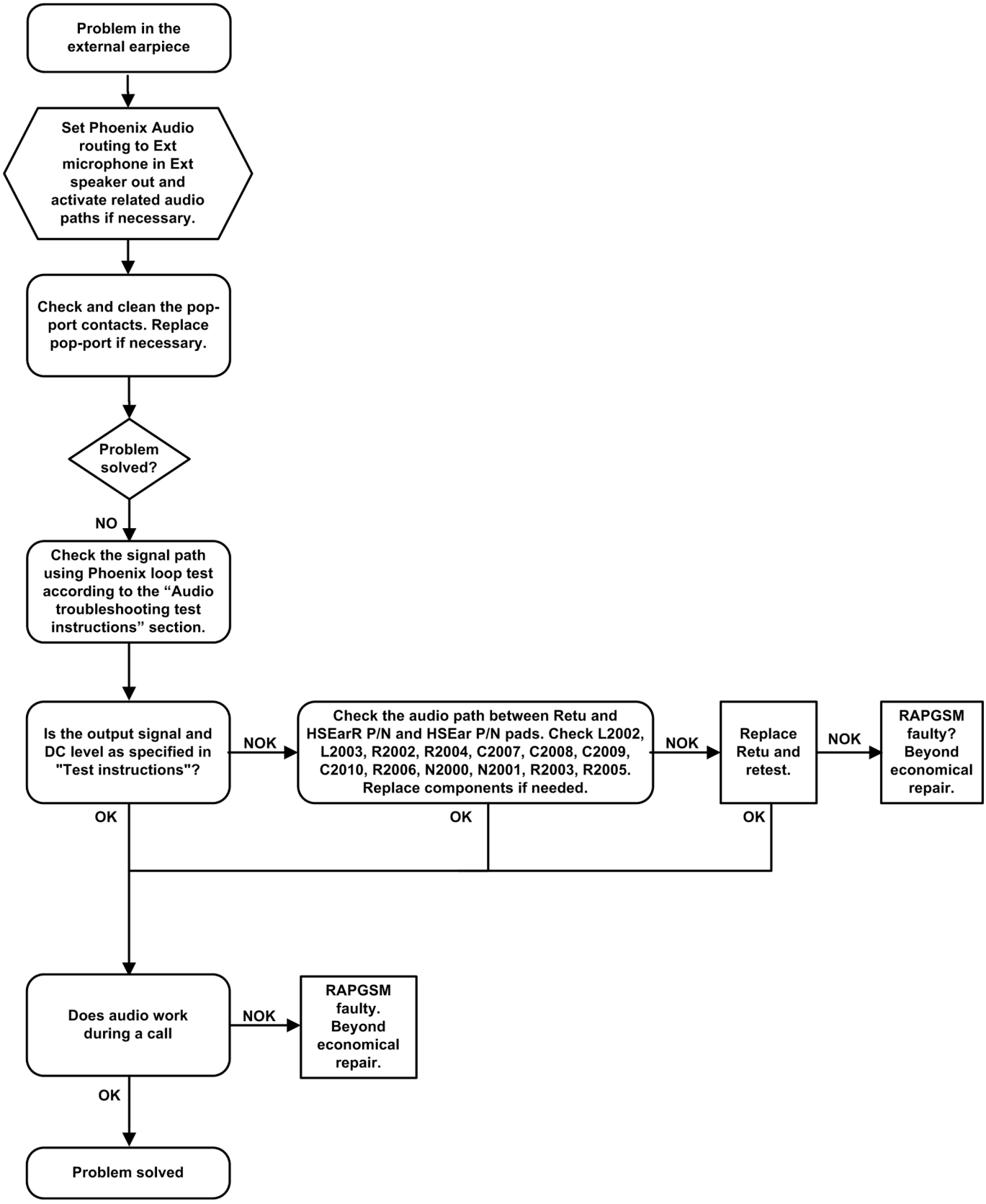
External earpiece troubleshooting

Troubleshooting flow



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Introduction to acoustics troubleshooting

Acoustics troubleshooting

Acoustics design ensures that the sound is detected correctly with a microphone and properly radiated to the outside of the device by speaker(s). The acoustics of the phone includes three basic systems: earpiece, Integrated Hands Free (IHF) and microphone.

The sound reproduced from the earpiece readiates through a single hole on the front cover (A-cover). The sound reproduced from the IHF speakers radiates from left and right sound holes located on both sides of the device. Microphone is located at the bottom, next to the system connector.

For a correct functionality of the phone, all sound holes must be always open. When the phone is used, care must be taken not to close any of those holes with a hand or fingers. The phone should be dry and clean, and no objects must be located in such a way that they close any of the holes.

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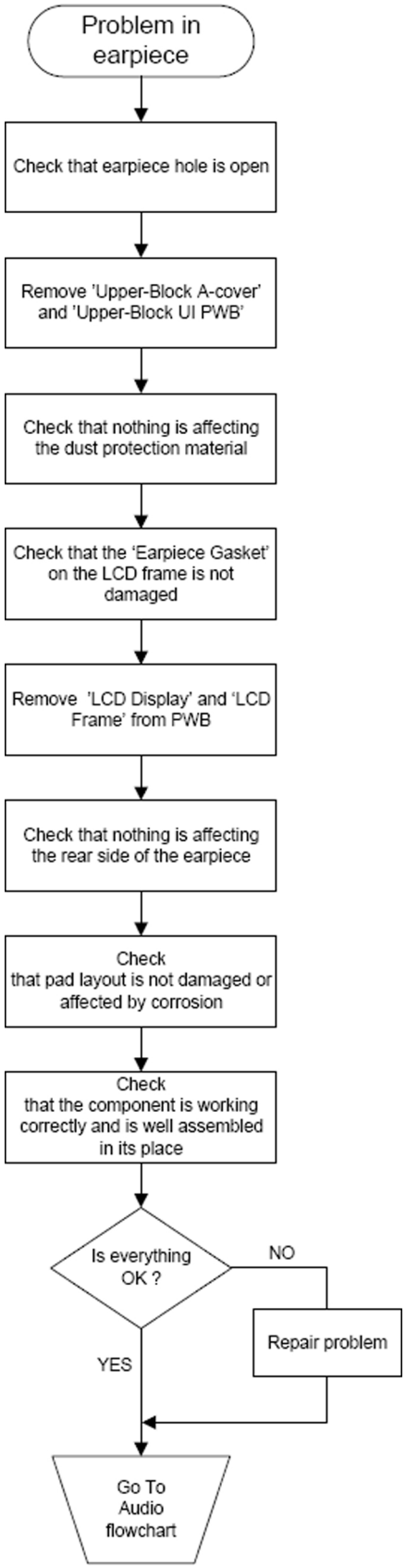
Earpiece troubleshooting

Troubleshooting flow



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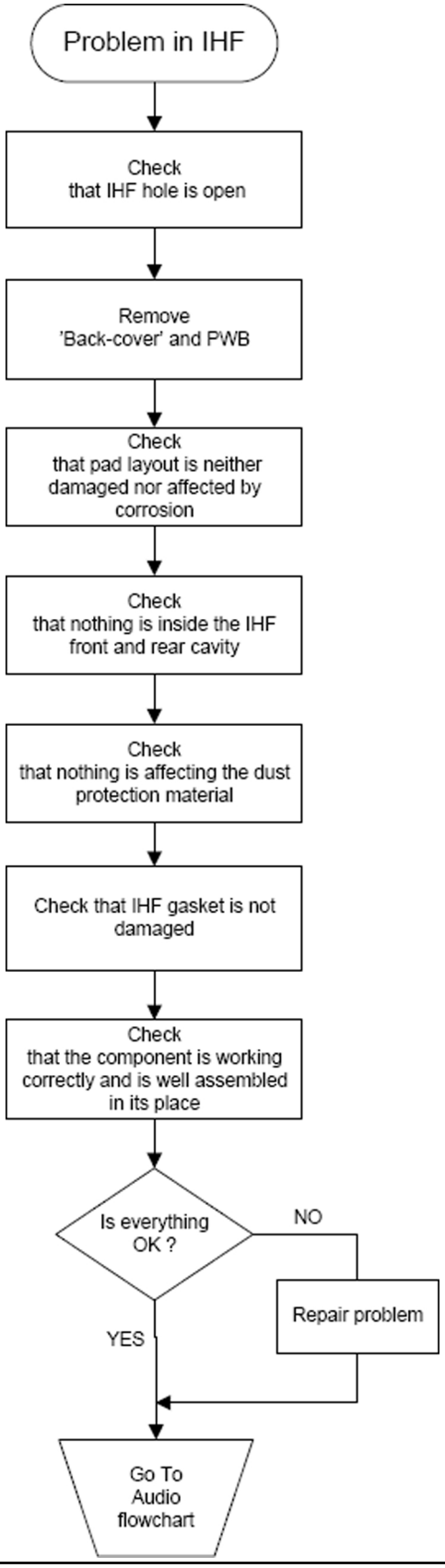
IHF troubleshooting

Troubleshooting flow



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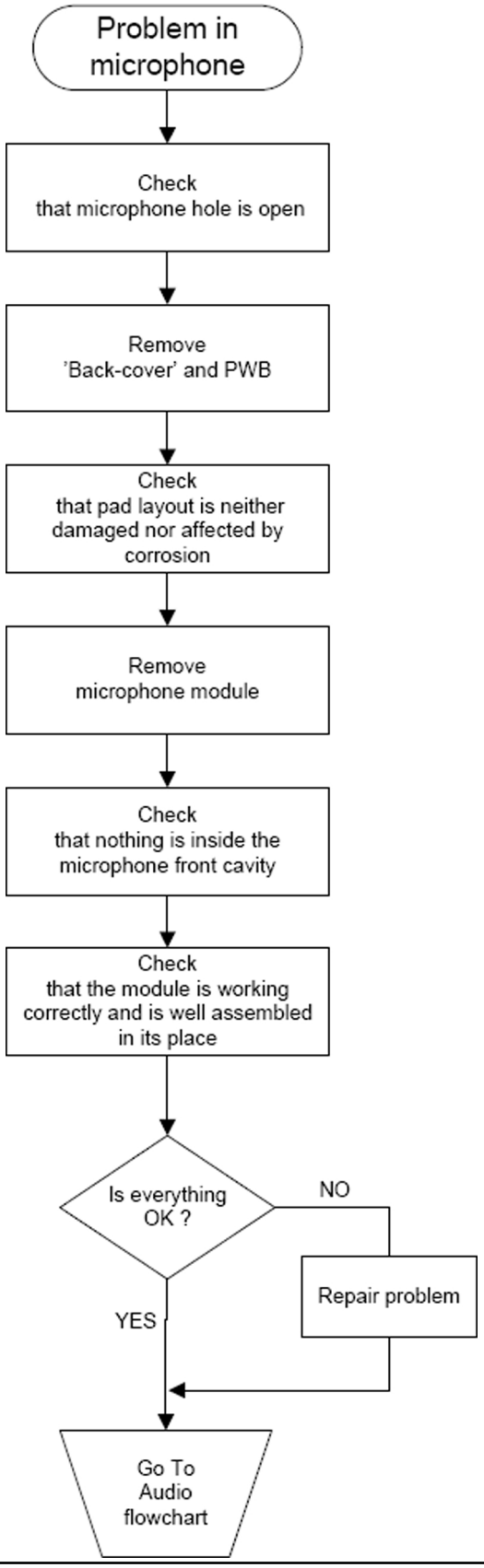
Microphone troubleshooting

Troubleshooting flow



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Bluetooth troubleshooting

Introduction to Bluetooth troubleshooting

There are two main Bluetooth (BT) problems that can occur:

Problem	Description
Detachment of the BT antenna.	This would most likely happen if the device has been dropped repeatedly to the ground. It could cause the BT antenna to become loose or partially detached from the PWB.
A malfunction in the BT ASIC, BB ASICs or the phone's BT SMD components.	This is unpredictable and could have many causes i.e. SW or HW related.

The main issue is to find out if the problem is related to the BT antenna or related to the BT system or the phone's BB and then replace/fix the faulty component. For location of the antenna, please refer to the exploded view in the Parts and layouts section.

Bluetooth settings for Phoenix

Steps

1. Start *Phoenix* service software.
2. From the **File** menu, choose **Open Product**, and then choose the correct type designator from the **Product** list.
3. Place the phone to a flash adapter in the local mode.
4. Choose **Testing→Bluetooth LOCALS** .
5. Locate JBT-9's serial number (12 digits) found in the type label on the back of JBT-9.

   In addition to JBT-9, also JBT-3 and JBT-6 Bluetooth test boxes can be used.
6. In the *Bluetooth LOCALS* window, write the 12-digit serial number on the **Counterpart BT Device Address** line.

   This needs to be done only once provided that JBT-9 is not changed.
7. Place the JBT-9 box near (within 10 cm) the BT antenna and click **Run BER Test**.

Results

Bit Error Rate test result is displayed in the *Bit Error Rate (BER) Tests* pane in the *Bluetooth LOCALS* window.

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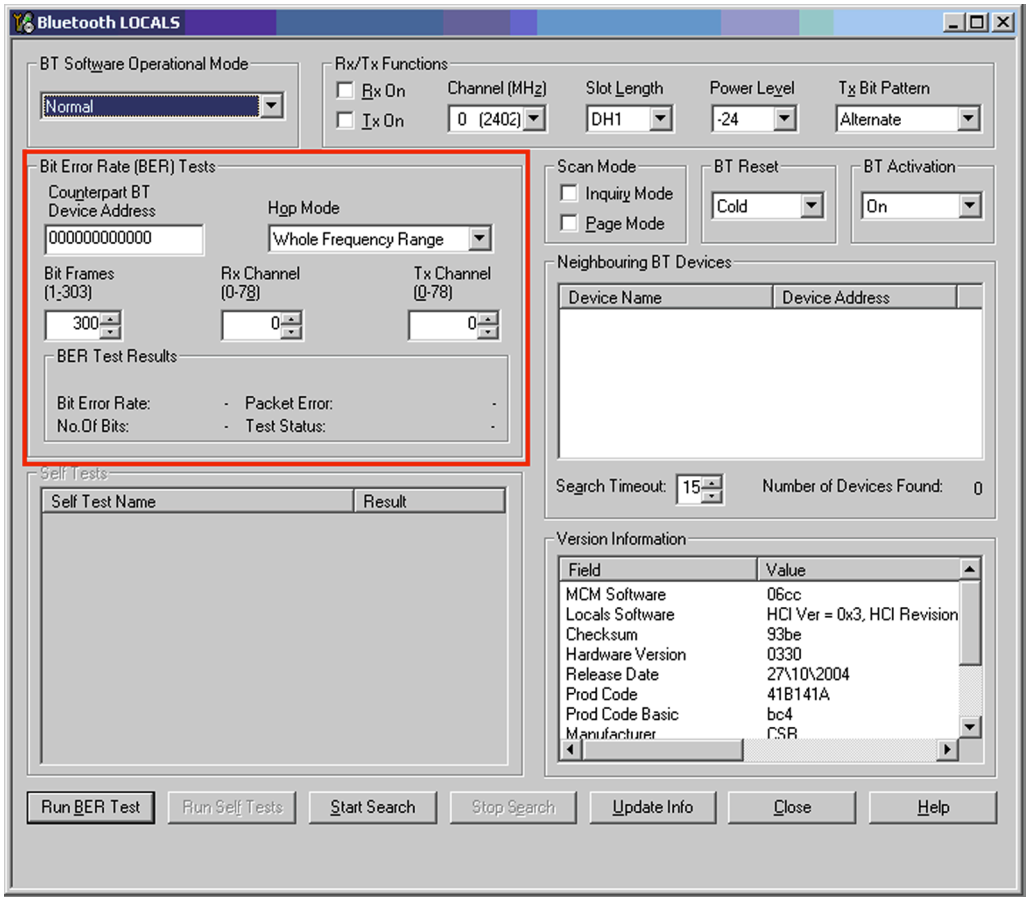

Figure 38 BER test result

Bluetooth self tests in Phoenix

Steps

1. Start *Phoenix* service software.
2. Choose**File→Scan Product.**
3. Place the phone to a flash adapter.
4. From the **Mode** drop-down menu, set mode to **Local**.
5. Choose **Testing→Self Tests.**
6. In the *Self Tests* window check the following Bluetooth related tests:
   - **ST_LPRF_IF_TEST**
   - **ST_LPRF_AUDIO_LINES_TEST**
   - **ST_BT_WAKEUP_TEST**

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7. To run the tests, click **Start**.

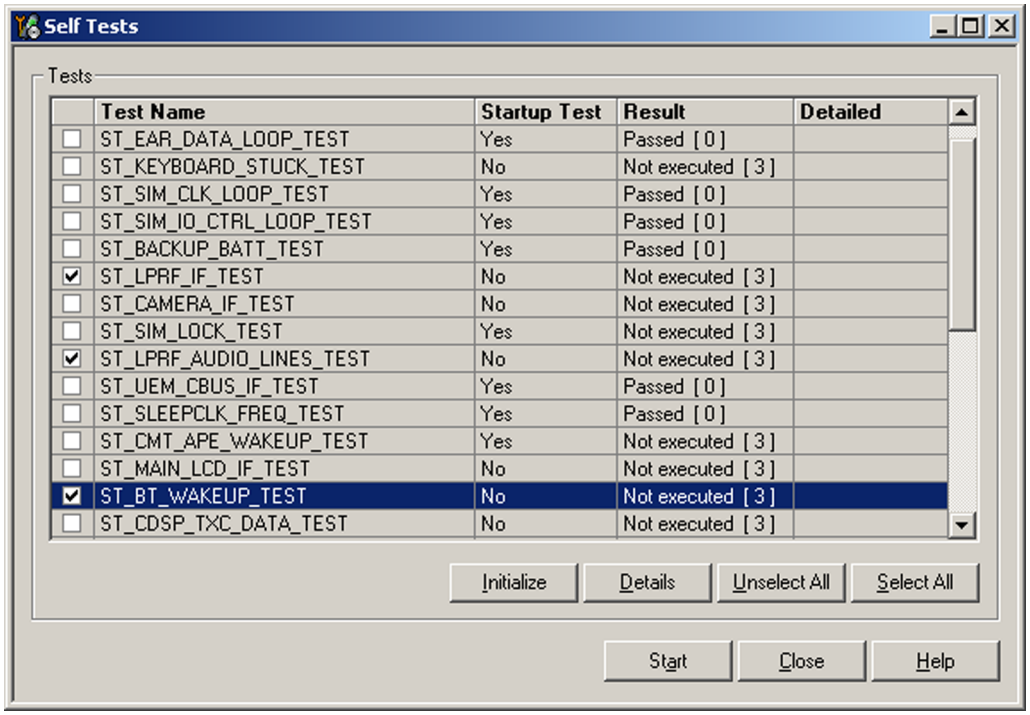

Figure 39 Bluetooth self tests in *Phoenix*

Bluetooth BER failure troubleshooting

Context

Basic encoding rules, BER, is a self-identifying and self-delimiting encoding scheme, which means that each data value can be identified, extracted and decoded individually.

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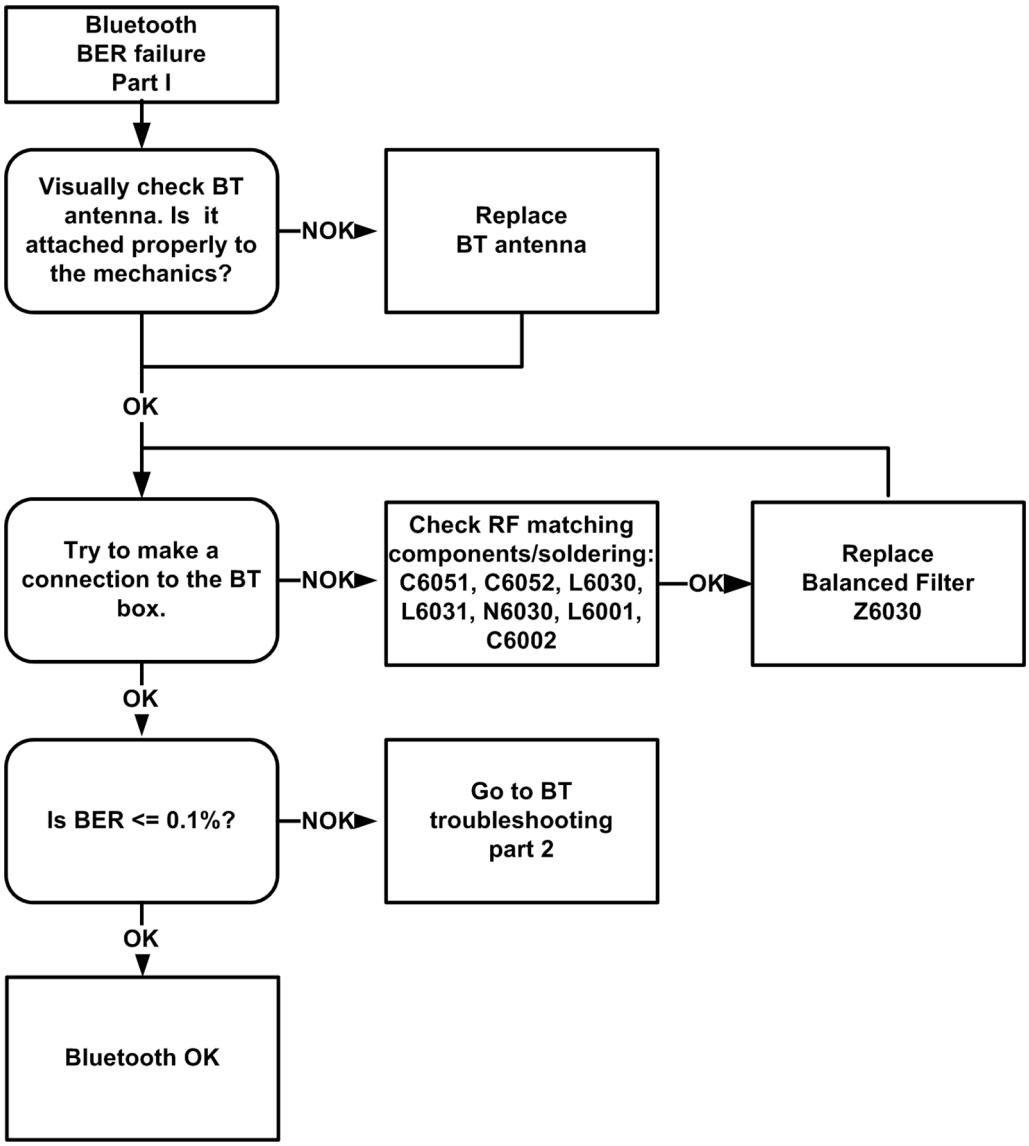
Part 1: Bluetooth self test passed but BER test failed



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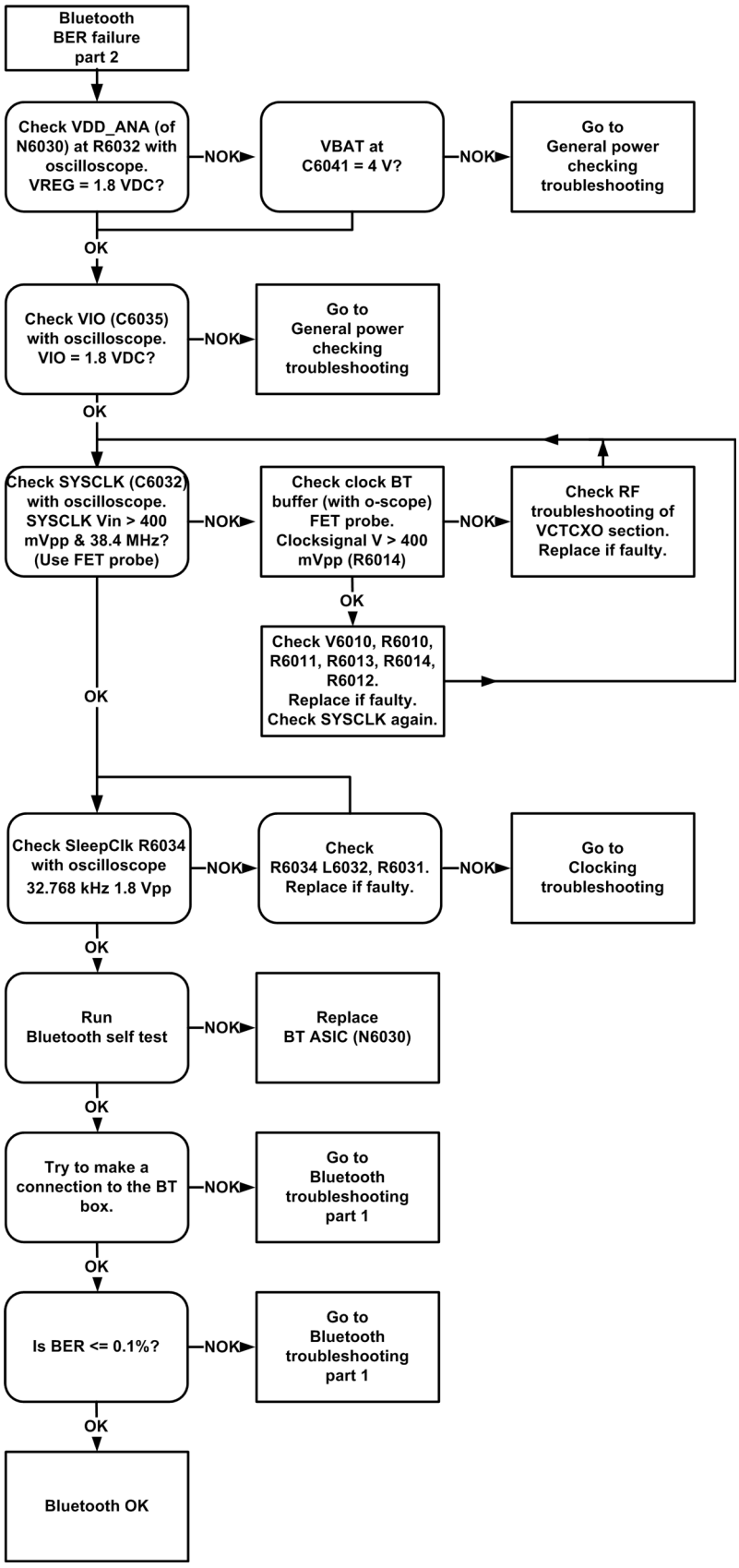
Part 2: Bluetooth self test failed



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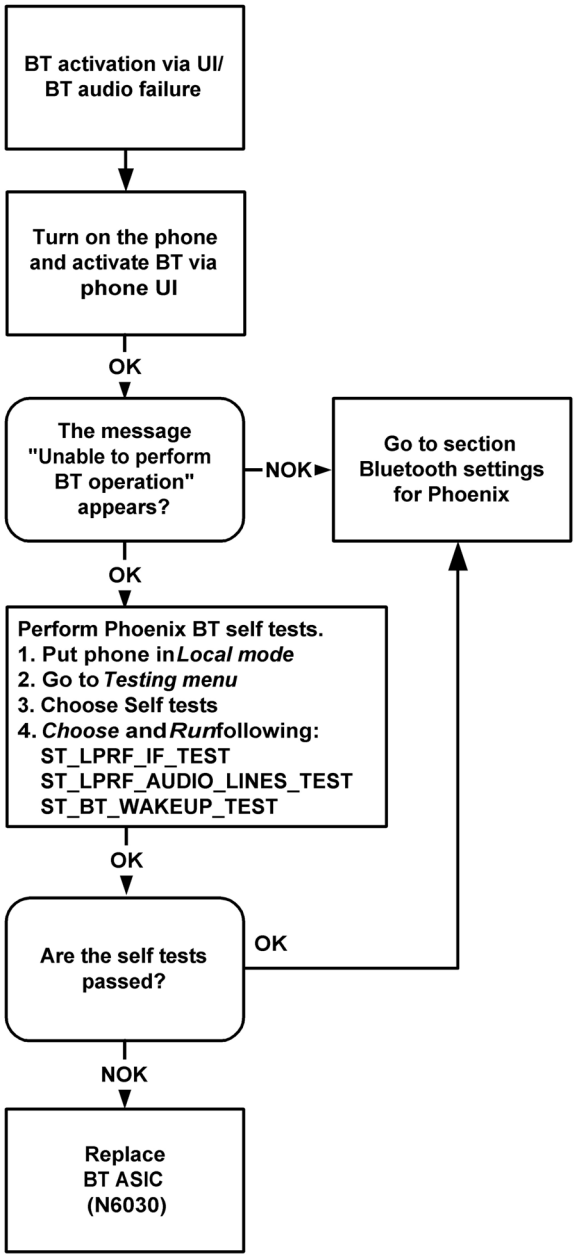
Bluetooth audio and UI activation troubleshooting

Troubleshooting flow



Baseband manual tuning guide

Certificate restoring for BB5.0 products

Context

This procedure is performed when the device certificate is corrupted for some reason.

All tunings (RF & Baseband, UI) must be done after performing the certificate restoring procedure.

The procedure for certificate restoring is the following:

- Flash the phone with the latest available software using FPS-8 or FPS-10.

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Note: USB flashing does not work for a dead BB5.0 phone.

- Create a request file.
- Send the file to Nokia by e-mail. Use the following addresses depending on your location:
  - APAC: sydney.service@nokia.com
  - CHINA: repair.ams@nokia.com
  - E&A: salo.repair@nokia.com
  - AMERICAS: fls1.usa@nokia.com
- When you receive a reply from Nokia, carry out certificate restoring.
- Tune the phone completely.

  Note: SX-4 smart card is needed.
- If the phone resets after certificate restoring, reflash the phone again.

Required equipment and setup:

- *Phoenix* service software v 2004.39.7.70 or newer.
- The latest phone model specific *Phoenix* data package.
- PKD-1 dongle
- SX-4 smart card (Enables BB5.0 testing and tuning features)
- External smart card reader

  Note: The smart card reader is only needed when FPS-8 is used. FPS-10 has an integrated smart card reader.
- Activated FPS-8 flash prommer **OR** FPS-10 flash prommer
- Flash update package 03.18.004 or newer for FPS-8 or FPS-10 flash prommers
- CU-4 control unit
- USB cable from PC USB Port to CU-4 control unit
- Phone model specific adapter for CU-4 control unit
- PCS-1 cable to power CU-4 from external power supply
- XCS-4 modular cable between flash prommer and CU-4

  Note: CU-4 must be supplied with +12 V from an external power supply in all steps of certificate restoring.

Steps

1. Program the phone software.
   i Start *Phoenix* and login. Make sure the connection has been managed correctly for FPS-8 or FPS-10.
   ii Update the phone MCU software to the latest available version.
   If the new flash is empty and the phone cannot communicate with *Phoenix*, reflash the phone.
   iii Choose the product manually from **File→Open Product** , and click **OK**.
   Wait for the phone type designator (e.g. “RM-1”) to be displayed in the status bar.
   iv Go to **Flashing→SW Update** and wait until *Phoenix* reads the product data as shown in the following picture.

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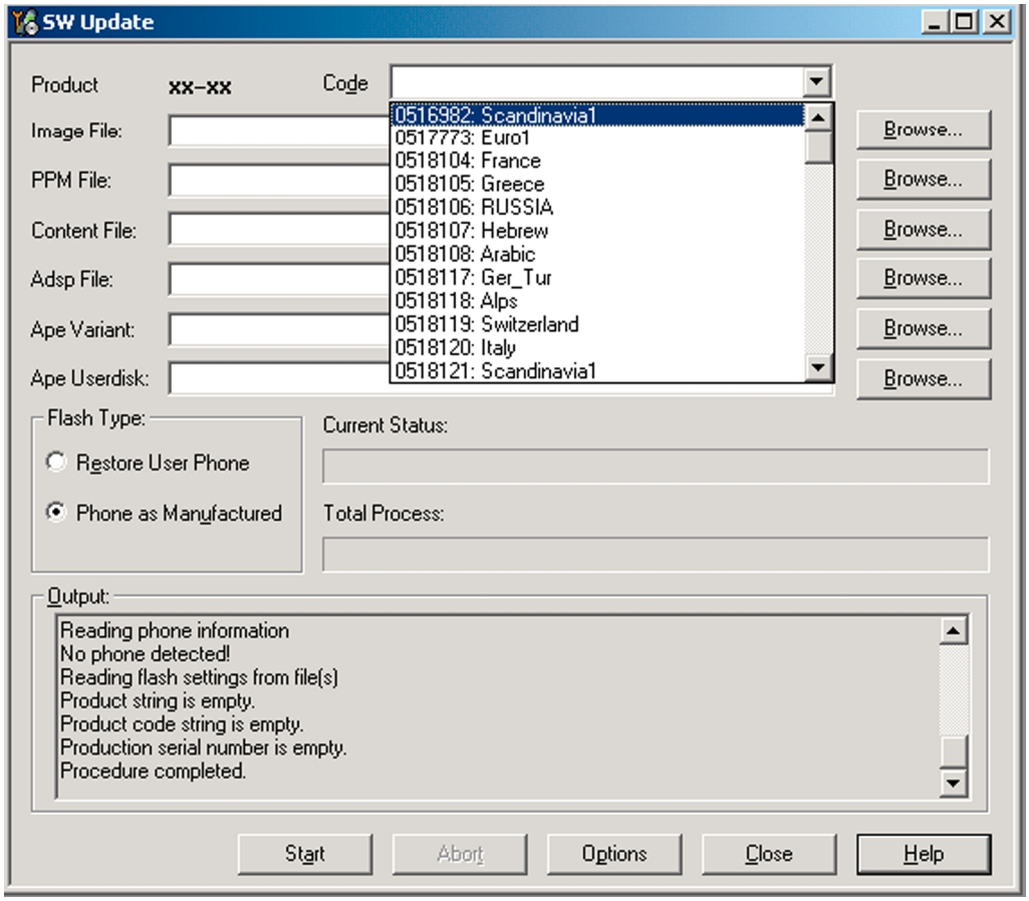

Product	is automatically set according to the phone support module which was opened manually, but the flash files cannot be found because the correct data cannot be read from the phone automatically.
Code	must be chosen manually, it determines the correct flash files to be used. Please choose the correct product code (can be seen in the phone type label) from the dropdown list.
Flash Type	must be set to **Phone as Manufactured**.

v To continue, click **Start**.

Progress bars and messages on the screen show actions during phone programming, please wait.

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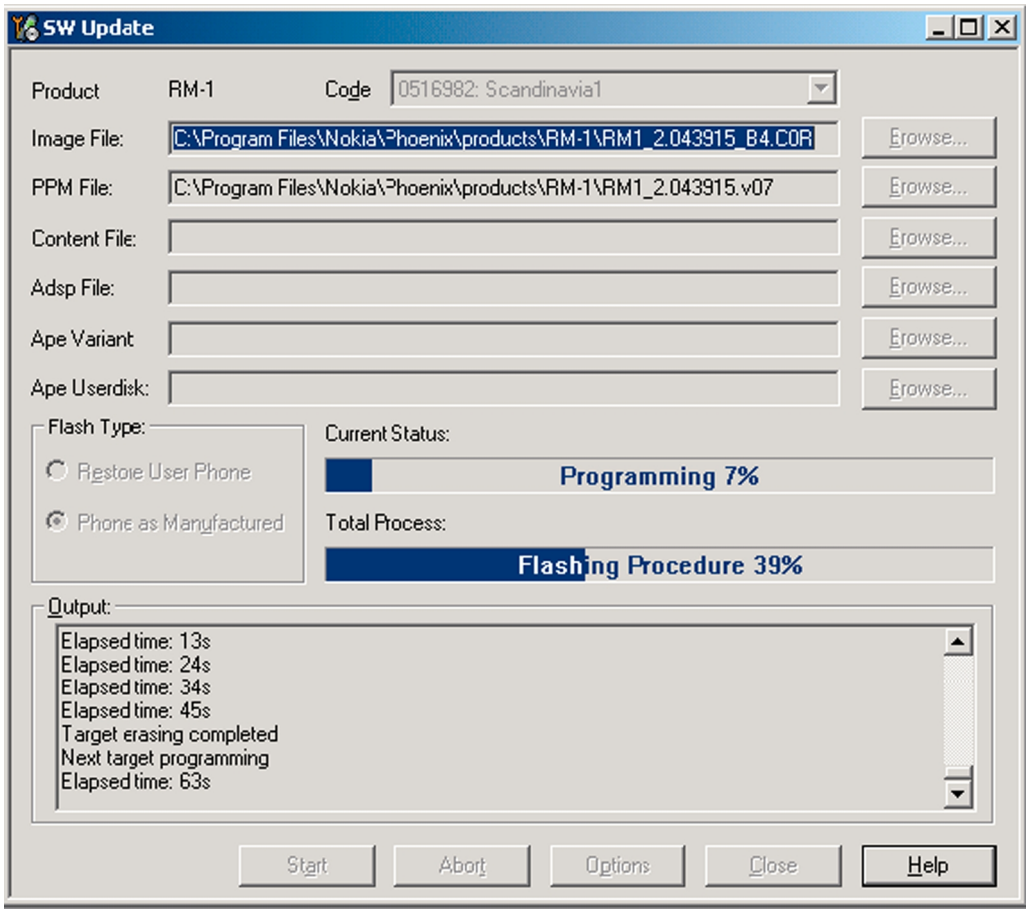


Programming is completed when *Flashing Completed* message is displayed.

The product type designator and MCU SW version are displayed in the status bar.

vi Close the *SW Update* window and then choose **File→Close Product** .

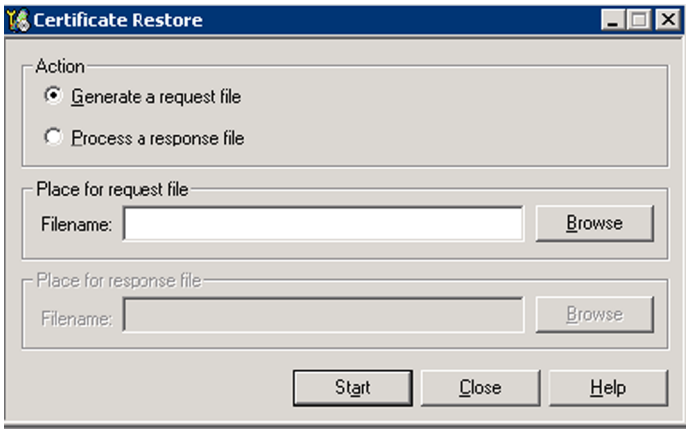
2. Create a *Request* file.

For this procedure, you must supply +12 V to CU-4 from an external power supply.

i To connect the phone with *Phoenix*, choose **File→Scan Product** .

ii Choose **Tools→Certificate Restore** .

iii To choose a location for the request file, click **Browse**.



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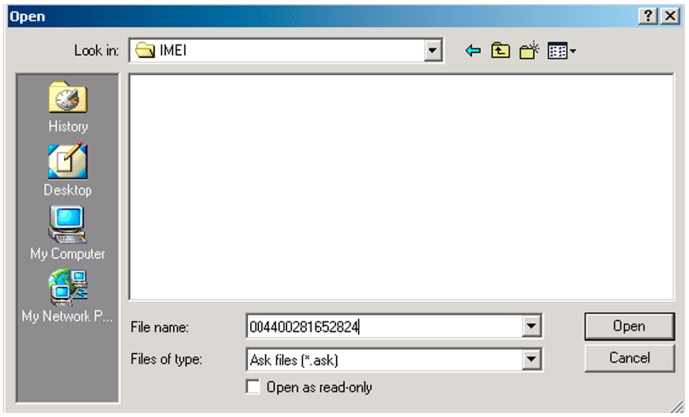
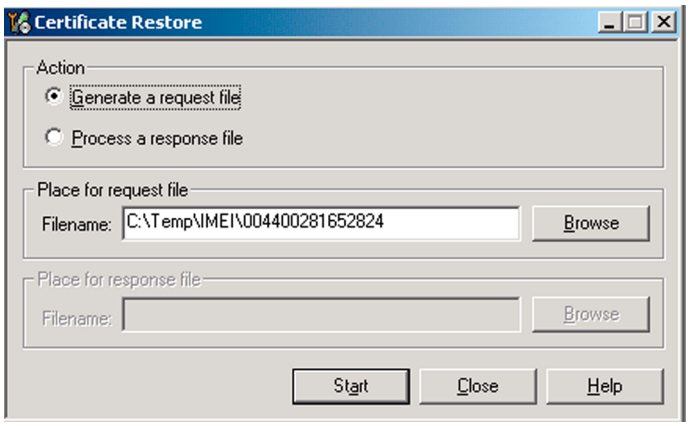
iv Name the file so that you can easily identify it, and click **Open**.



The name of the file and its location are shown.



v To create the *Request* file, click **Start**.

vi When the file for certificate restore has been created, send it to Nokia as an e-mail attachment.

3. Restore certificate.

For this procedure, you must supply +12 V to CU-4 from an external power supply.

i Save the reply file sent by Nokia to your computer.

ii Start *Phoenix* service software.

iii Choose **File→Scan Product** .

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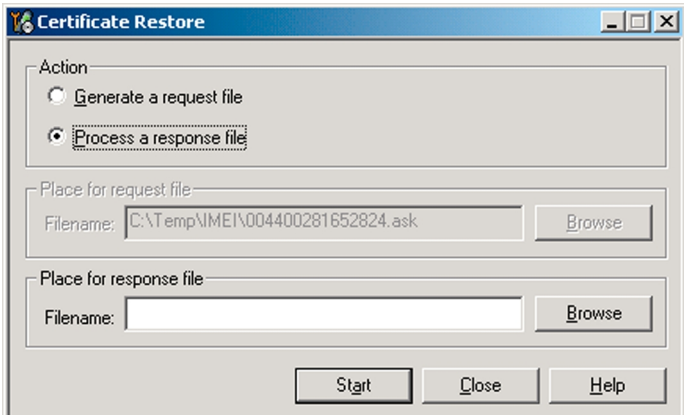
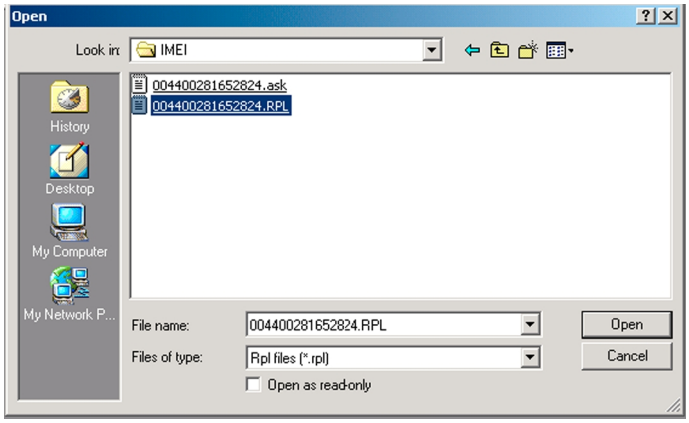
iv From the **Tools** menu, choose **Certificate Restore** and select **Process a response file** in the *Action* pane.



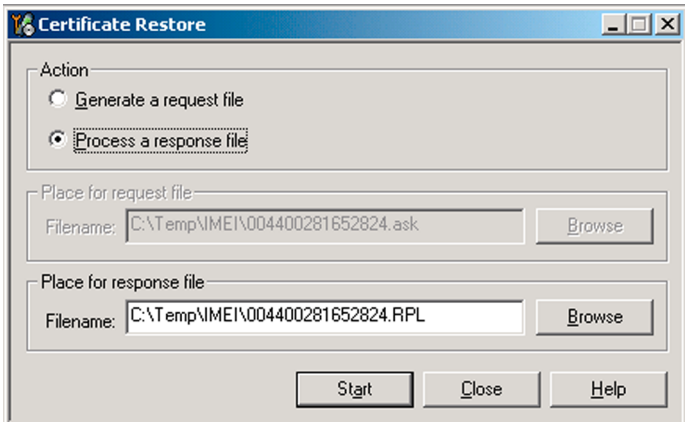
v To choose the location where response file is saved, click **Browse**.

vi Click **Open**.



The name of the file and the path where it is located are shown.

vii To write the file to phone, click **Start**.



Next action

After a successful rewrite, you must retune the phone completely by using *Phoenix* tuning functions.

Important: Perform all tunings: RF, BB, and UI.

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Energy management calibration

Before you begin

Energy Management (EM) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, **battery voltage**, **BSI**, **battery current**) to get an accurate AD conversion result.

Hardware setup:

- An external power supply is needed.
- Supply 12V DC from an external power supply to CU-4 to power up the phone.
- The phone must be connected to a CU-4 control unit with a product-specific flash adapter.

Steps

1. Place the phone to the docking station adapter (CU-4 is connected to the adapter).
2. Start *Phoenix* service software.
3. Choose **File→ Scan Product.**
4. Choose **Tuning→Energy Management Calibration.**
5. To show the current values in the phone memory, click **Read**, and check that communication between the phone and CU-4 works.
6. Check that the **CU-4 used** check box is checked.
7. Select the item(s) to be calibrated.

   Note: ADC calibration has to be performed before other item(s). However, if all calibrations are selected at the same time, there is no need to perform the ADC calibration first.
8. Click **Calibrate**.

   The calibration of the selected item(s) is carried out automatically.

   The candidates for the new calibration values are shown in the *Calculated values* column. If the new calibration values seem to be acceptable (please refer to the following "Calibration value limits" table), click **Write** to store the new calibration values to the phone permanent memory.

Table 11 Calibration value limits

Parameter	Min.	Max.
ADC Offset	-20	20
ADC Gain	12000	14000
BSI Gain	1100	1300
VBAT Offset	2400	2650
VBAT Gain	19000	23000
VCHAR Gain	N/A	N/A
IBAT (ICal) Gain	7750	12250

9. Click **Read**, and confirm that the new calibration values are stored in the phone memory correctly. If the values are not stored to the phone memory, click **Write** and/or repeat the procedure again.
10. To end the procedure, close the *Energy Management Calibration* window.

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7 — RF Troubleshooting and Manual Tuning Guide

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Introduction to RF troubleshooting

On the following pages you will find a step-by-step troubleshooting procedure and reference measurements at the relevant signal points. For functional descriptions, please refer to the System module section.

Notes on reference measurements

All measurements must be done using:

- spectrum analyser with a high-frequency high-impedance passive probe (LO-/reference frequencies and RF power levels)
- oscilloscope with a 10:1 probe (DC-voltages and low frequency signals)

Important: All measurements with an RF coupler must be performed in an RF shielded environment, or where there are no transmissions on the same frequencies. This may disturb sensitive receiver measurements.

Repairing this phone - important

The RF section of the phone is built around one RF ASIC. Before changing the RF ASIC, please make sure that supply voltages and serial communication coming from baseband to RF are OK.

Please note that the grounding of the FEM module is directly below the FEM module. Therefore, it is difficult to check or change the module.

Most RF semiconductors are static discharge sensitive! ESD protection must be taken care of during repair (ground straps and ESD soldering irons). The RF ASIC and FEM are moisture sensitive, so parts must be pre-baked prior to soldering.

In addition to key components, there are lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done mainly by checking if the soldering of the component is done properly.

Capacitor can be checked for shorts and resistors for value by means of an ohmmeter, but be aware in-circuit measurements should be evaluated carefully.

Keep in mind that all measured voltages or RF levels depicted in the service manual are rough figures. Especially RF levels vary because of different measuring equipment or different grounding of the probe used.

When using an RF probe, use a pair of metallic tweezers to connect the probe ground to the PWB ground as close to the measurement point as possible. If measurements are performed in a product specific module jig, then “GND” pads should be used for the probe ground.

Receiver troubleshooting

Introduction to RX troubleshooting

Rx can be tested by making a phone call or in the local mode. For the local mode testing, use Phoenix service software.

The main Rx troubleshooting measurement is RSSI measurement. This test measures the signal strength of the received signal. I and Q branches can be measured separately.

In GSM, the input signal can be either a real GSM signal or a CW signal that is 67.771kHz up from the carrier frequency.

For service tool usage instructions, refer to section Service Tools and Service Concepts.

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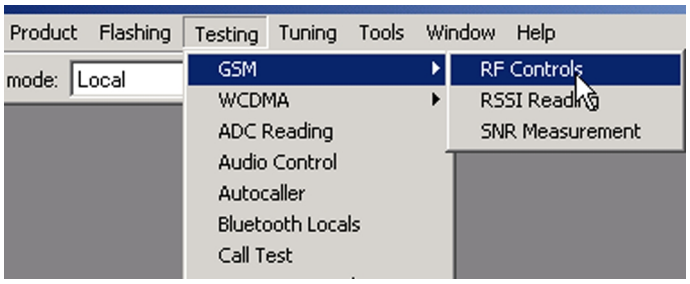
General instructions for RX troubleshooting

Steps

1. Connect a test jig to a computer with a DAU-9S cable or to a FPS-10 flash prommer with a modular cable (XCS-4).

   Make sure that you have a PKD-1 dongle connected to the computer's parallel port.
2. Connect CU-4 with 12 V supply. The DC supply voltage is set to 3.7 V by default (in Phoenix).
3. Connect an RF cable between the RF connector of the module test jig (MJ-62) and measurement equipment or alternatively use a 50 Ω (at least 2 W) dummy load in the module test jig RF connector, otherwise the RF part may be damaged.

   Note: Make sure that all connections are made to the correct RF connector.
4. Set Rx on.
   i Set the phone module to the test jig and start *Phoenix service software*.
   ii Initialize connection to the phone. (With the FPS-10 prommer use FPS10_USB or FPS10_TCP drivers, depending on connection type. When using DAU-9S select FBUS).
   iii From the File menu, choose product: **File -> Choose Product -> xx-x*** (* = type designator of the phone, eg. RM-70), or press **Ctrl + R** to scan product.
   iv From the toolbar, set operating mode to “Local”.
5. EGSM900/1800/1900 troubleshooting
   i From the Testing menu, activate the *RF Controls* window: **Testing -> GSM -> RF Controls** .



   ii In the *RF Controls* window:
   - Select band (Default = “GSM900”).
   - Set Active unit to “Rx” (Default).
   - Set Operation mode to “Burst” (Default).
   - Set Rx/Tx channel (see table below).
   - Apply a frequency (see table below) to the RF-connector.

     Note: Remember to compensate for cable attenuation, specific for MJ-62. You will find the values in the Service tools section.

   Apply 942.46771 MHz (channel 37 + 67.710 kHz offset), MHz (channel 700 + 67.710 kHz offset) or MHz (channel 661 + 67.71 kHz) –90 dBm signal to the RF-connector (remember to compensate for cable attenuation).

Band	Channel (RX and TX)	Input frequency (MHz)	Offset (kHz)	Power level (dBm)
GSM900	37	942.46771	67.710	-90

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Band	Channel (RX and TX)	Input frequency (MHz)	Offset (kHz)	Power level (dBm)
GSM1800	700	1842.86771	67.710	-90
GSM1900	661	1960.06771	67.710	-90

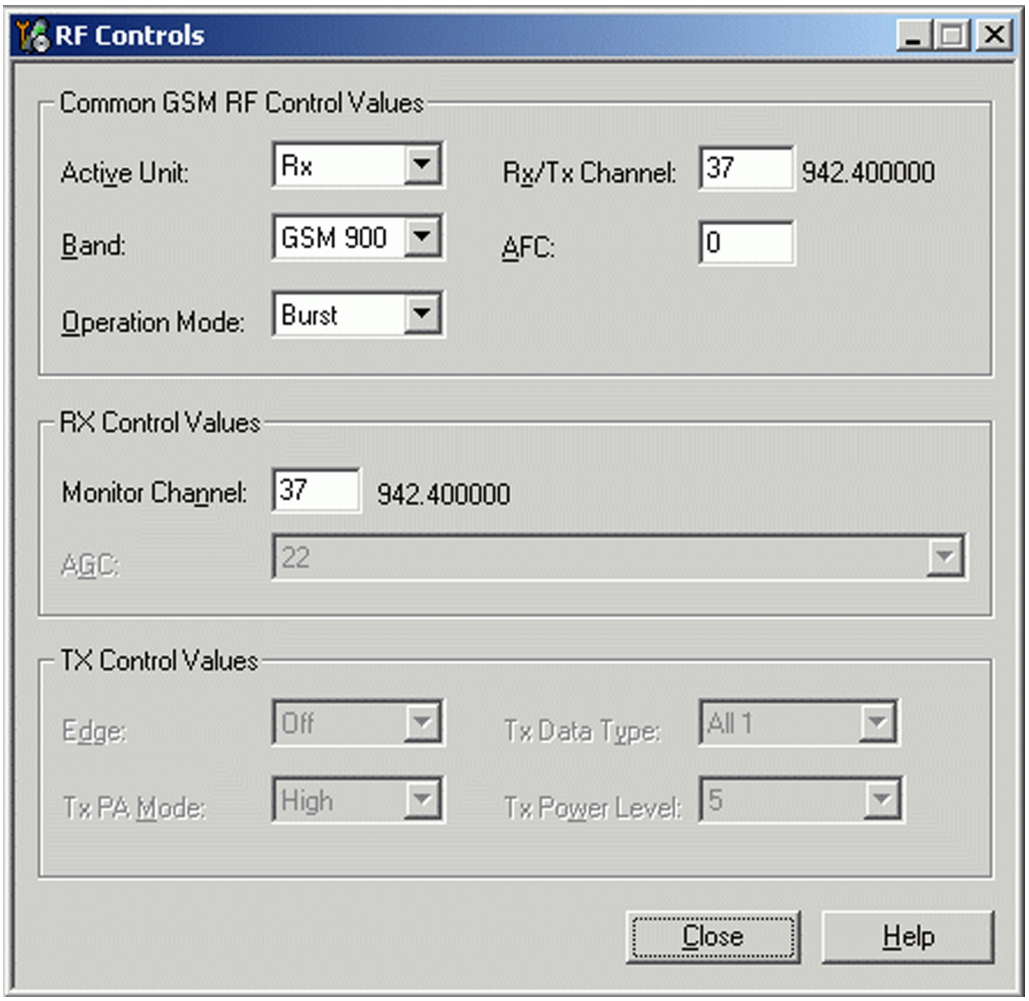

Figure 40 RF Controls window

Reciever (RX) troubleshooting

Context

Troubleshoot one band at a time. Start with the GSM900 and end with GSM1900.

Receiver troubleshooting

Apply a signal according to the table in General instructions for RX troubleshooting (page 7–6)

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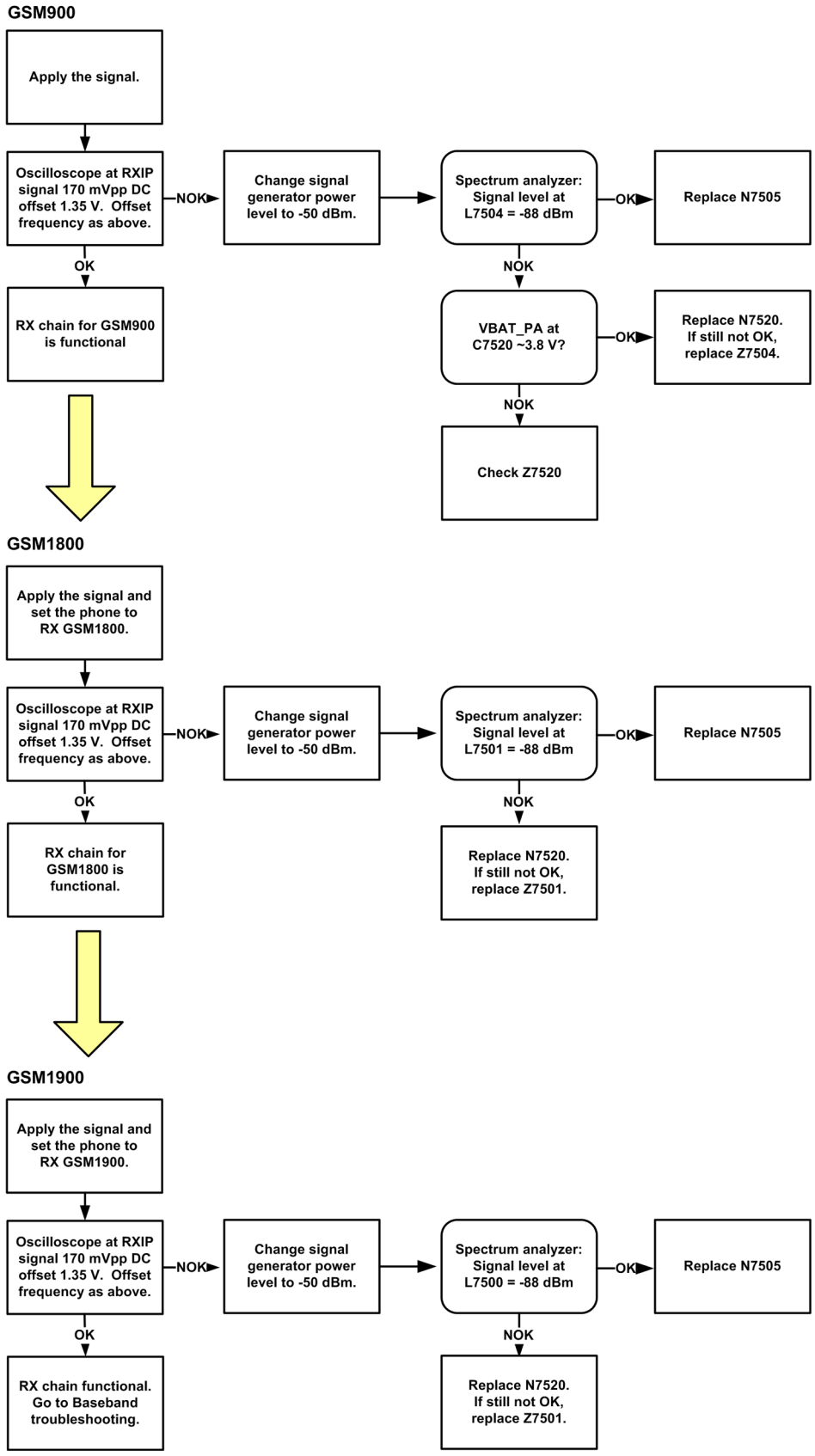

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GSM Rx chain activation for manual measurements / GSM RSSI measurement

Context

RSSI signal measurement is the main Rx troubleshooting measurement. The test measures the strength of the received signal.

I and Q branches can be measured separately. In GSM, the input signal can be either real GSM signal or a CW (Continuous Wave) signal that is 67.771 kHz above the carrier frequency.

Steps

1. Start *Phoenix* service software.
2. Choose **Testing→GSM→RSSI Reading.**
3. Set the RF signal generator for channel frequency +67.771 kHz CW mode with –80 dBm signal.

   Alternatively set the cellular tester downlink channel to the appropriate channel. Make sure that the tester is set to continuous mode, not to burst mode.
4. In the *RSSI Reading* window, select the appropriate band and channel.

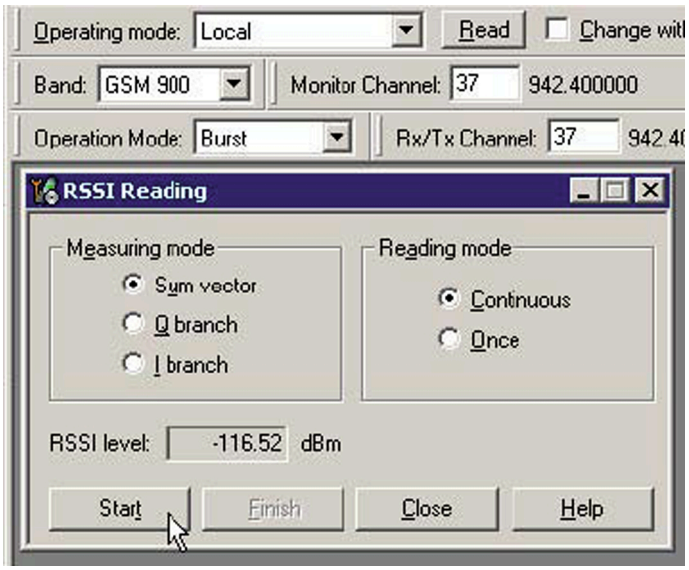

Figure 41 *RSSI Reading* window

5. To start the measurement/activate GSM Rx chain, click **Start**.

Results

RSSI reading values of the selected band and channel are displayed. The RSSI level must be the same value which is set for the signal generator (-90 dBm).

Transmitter troubleshooting

General instructions for TX troubleshooting

Context

- Tx troubleshooting requires Tx operation.
- Do not transmit on frequencies that are in use!
- Transmitter can be controlled in the local mode for diagnostic purposes.

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- The most useful Phoenix tool for GSM transmitter testing is "RF Controls".
- Tx IQ tuning and Tx power tuning can be also used in some cases.
- Remember that retuning is not a fix! Phones are tuned correctly in production.

The first set of steps instructs how to assemble the test setup. This setup is general for all Tx troubleshooting tasks.

Alternative steps provide specific troubleshooting instructions for *Phoenix* service software.

> **Caution:** Never activate the GSM transmitter without a proper antenna load. There should be always 50 Ω load connected to the RF connector (antenna, RF-measurement equipment or at least 2 W dummy load), otherwise the GSM Power amplifier may be damaged.

Steps

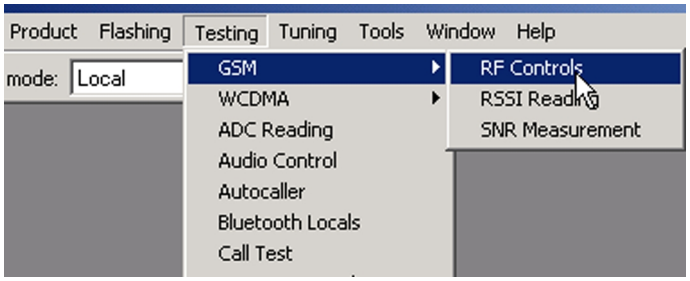
1. Connect a test jig to a computer with a DAU-9S cable or to a FPS-8 flash prommer with a modular cable (XCS-4).

   Make sure that you have a PKD-1 dongle connected to the computer's parallel port.
2. Connect CU-4 with 12 V supply. The DC supply voltage is set to 3.7 V by default (in Phoenix).
3. Connect an RF cable between the RF connector of the module test jig (MJ-62) and measurement equipment or alternatively use a 50 Ω (at least 2 W) dummy load in the module test jig RF connector, otherwise GSM may be damaged.

   > **Note:** There are two antenna connectors in the module jig:
   > - one for GSM
   > - one for Bluetooth
   >
   > Make sure that all connections are made to the correct RF connector.

   Normally a spectrum analyser is used as measurement equipment.

   > **Note:** The maximum input power of a spectrum analyser is +30 dBm.
   >
   > To prevent any damage, it is recommended to use 10 dB attenuator on the spectrum analyzer input.
4. Set Tx on.
   i Set the phone module to the test jig and start *Phoenix service software*.
   ii Initialize connection to the phone. (With FPS-8 use Combox driver. When using DAU-9S select FBUS driver).
   iii From the File menu, choose product: **File -> Choose Product -> xx-x*** (* = type designator of the phone)RM-70), or press**Ctrl + R** to scan product.
   iv From the toolbar, set operating mode to “Local”.
5. EGSM900/1800/1900 troubleshooting
   i From the Testing menu, activate the *RF Controls* window: **Testing -> GSM -> RF Controls** .



   ii In the *RF Controls* window:

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- Select band “GSM900” or “GSM1800” or “GSM1900” (Default = “GSM900”).
- Set Active unit to “Tx” (Default = “Rx”).
- Set Operation mode to “Burst” (Default).
- Set Tx data type to “All1” (Default).
- Set Rx/Tx channel (see table below)
- Set Edge to “Off” (Default).
- Set Tx PA mode to “High” (Default).
- Set power level (see table below)

Band	Channel (RX and TX)	TX power level
GSM900	37	5
GSM1800	700	0
GSM1900	661	0

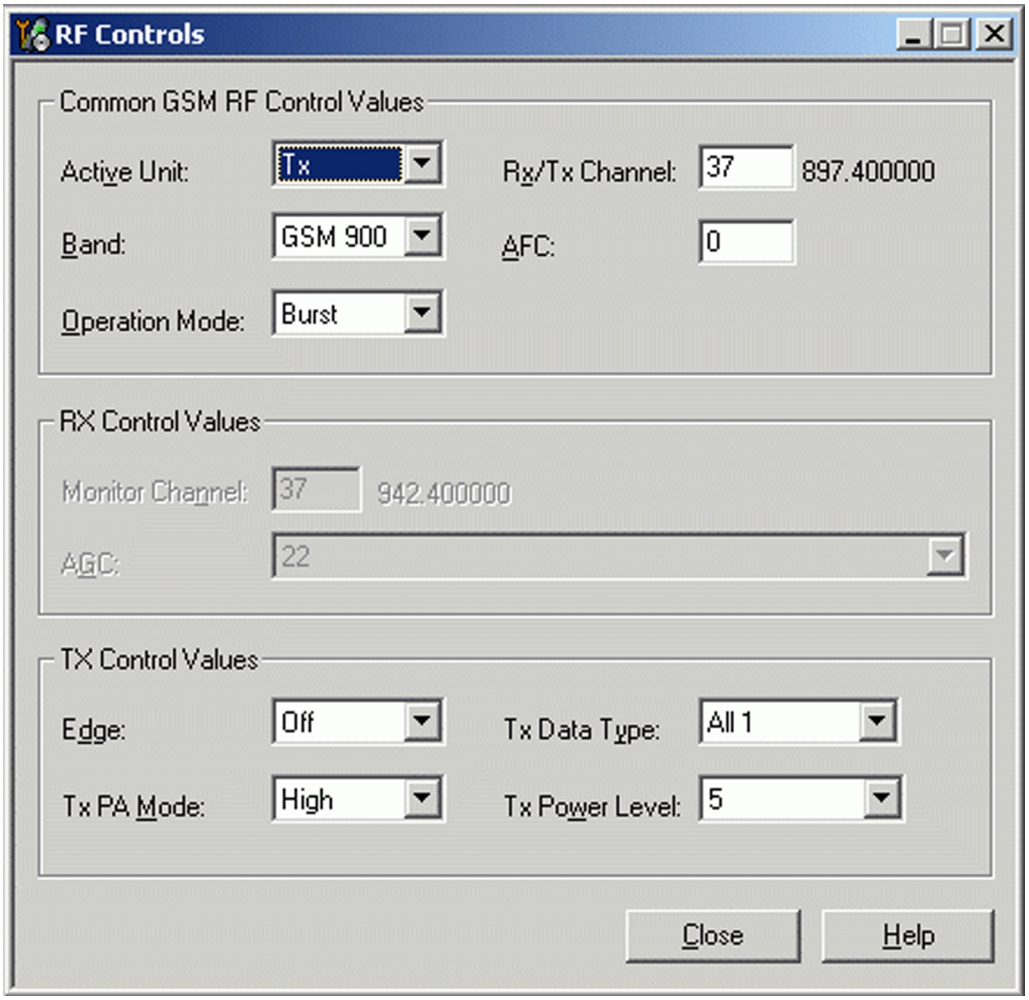

Figure 42 RF Controls window

General instructions for TX troubleshooting

Context

- Tx troubleshooting requires Tx operation.

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- Do not transmit on frequencies that are in use!
- Transmitter can be controlled in the local mode for diagnostic purposes.
- The most useful Phoenix tool for GSM transmitter testing is "RF Controls".
- Tx IQ tuning and Tx power tuning can be also used in some cases.
- Remember that retuning is not a fix! Phones are tuned correctly in production.

The first set of steps instructs how to assemble the test setup. This setup is general for all Tx troubleshooting tasks.

Alternative steps provide specific troubleshooting instructions for *Phoenix* service software.

> **Caution:** Never activate the GSM transmitter without a proper antenna load. There should be always 50 Ω load connected to the RF connector (antenna, RF-measurement equipment or at least 2 W dummy load), otherwise the GSM Power amplifier may be damaged.

Steps

1. Connect a test jig to a computer with a DAU-9S cable or to a FPS-10 flash prommer with a modular cable (XCS-4).

   Make sure that you have a PKD-1 dongle connected to the computer's parallel port.
2. Connect CU-4 with 12 V supply. The DC supply voltage is set to 3.7 V by default (in Phoenix).
3. Connect an RF cable between the RF connector of the module test jig (MJ-62) and measurement equipment or alternatively use a 50 Ω (at least 2 W) dummy load in the module test jig RF connector, otherwise GSM may be damaged.

   > **Note:** There are two antenna connectors in the module jig:
   > - one for GSM
   > - one for Bluetooth
   >
   > Make sure that all connections are made to the correct RF connector.

   Normally a spectrum analyser is used as measurement equipment.

   > **Note:** The maximum input power of a spectrum analyser is +30 dBm.
   >
   > To prevent any damage, it is recommended to use 10 dB attenuator on the spectrum analyzer input.
4. Set Tx on.
   i Set the phone module to the test jig and start *Phoenix service software*.
   ii Initialize connection to the phone. (With the FPS-10 prommer use FPS10_USB or FPS10_TCP drivers, depending on connection type. When using DAU-9S select FBUS driver).
   iii From the File menu, choose product: **File -> Choose Product -> xx-x*** (* = type designator of the phone)RM-70), or press**Ctrl + R** to scan product.
   iv From the toolbar, set operating mode to “Local”.
5. EGSM900/1800/1900 troubleshooting
   i From the Testing menu, activate the *RF Controls* window: **Testing -> GSM -> RF Controls** .

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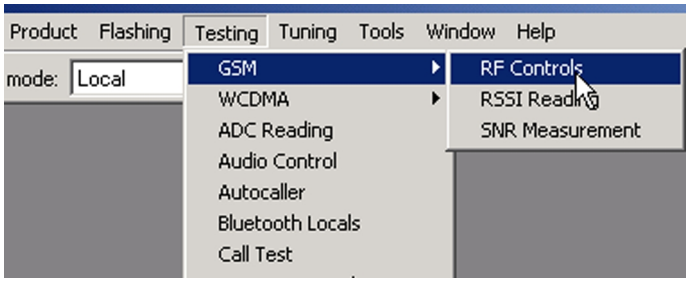

ii In the *RF Controls* window:

- Select band “GSM900” or “GSM1800” or “GSM1900” (Default = “GSM900”).
- Set Active unit to “Tx” (Default = “Rx”).
- Set Operation mode to “Burst” (Default).
- Set Tx data type to “All1” (Default).
- Set Rx/Tx channel (see table below)
- Set Edge to “Off” (Default).
- Set Tx PA mode to “High” (Default).
- Set power level (see table below)

Band	Channel (RX and TX)	TX power level
GSM900	37	5
GSM1800	700	0
GSM1900	661	0

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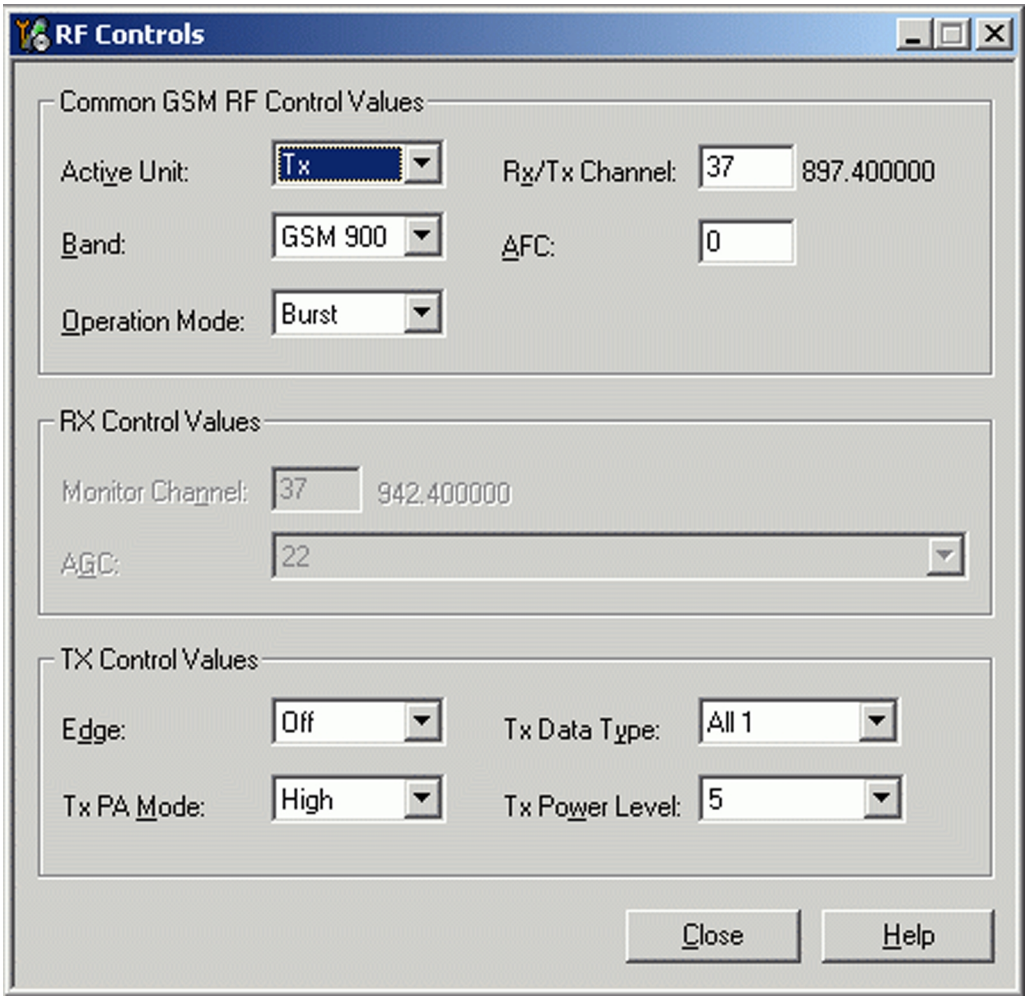

Figure 43 RF Controls window

Checking antenna functionality

In the antenna, there is one Feed and two GND contacts.

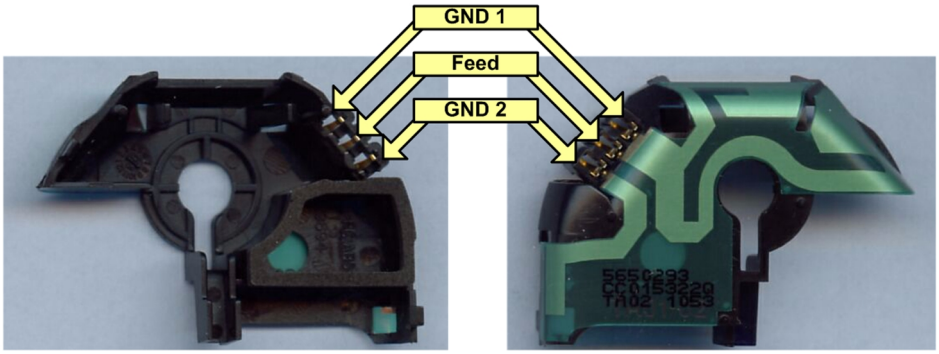

Figure 44 Antenna module

Between GND1 and Feed, a DC short-circuit can be measured.

GND2 has no DC connection to the other contacts.

The antenna is functioning normally when the contacts function (Feed-GND1 = 0 Ω) Also check visually to make sure that the antenna is intact.

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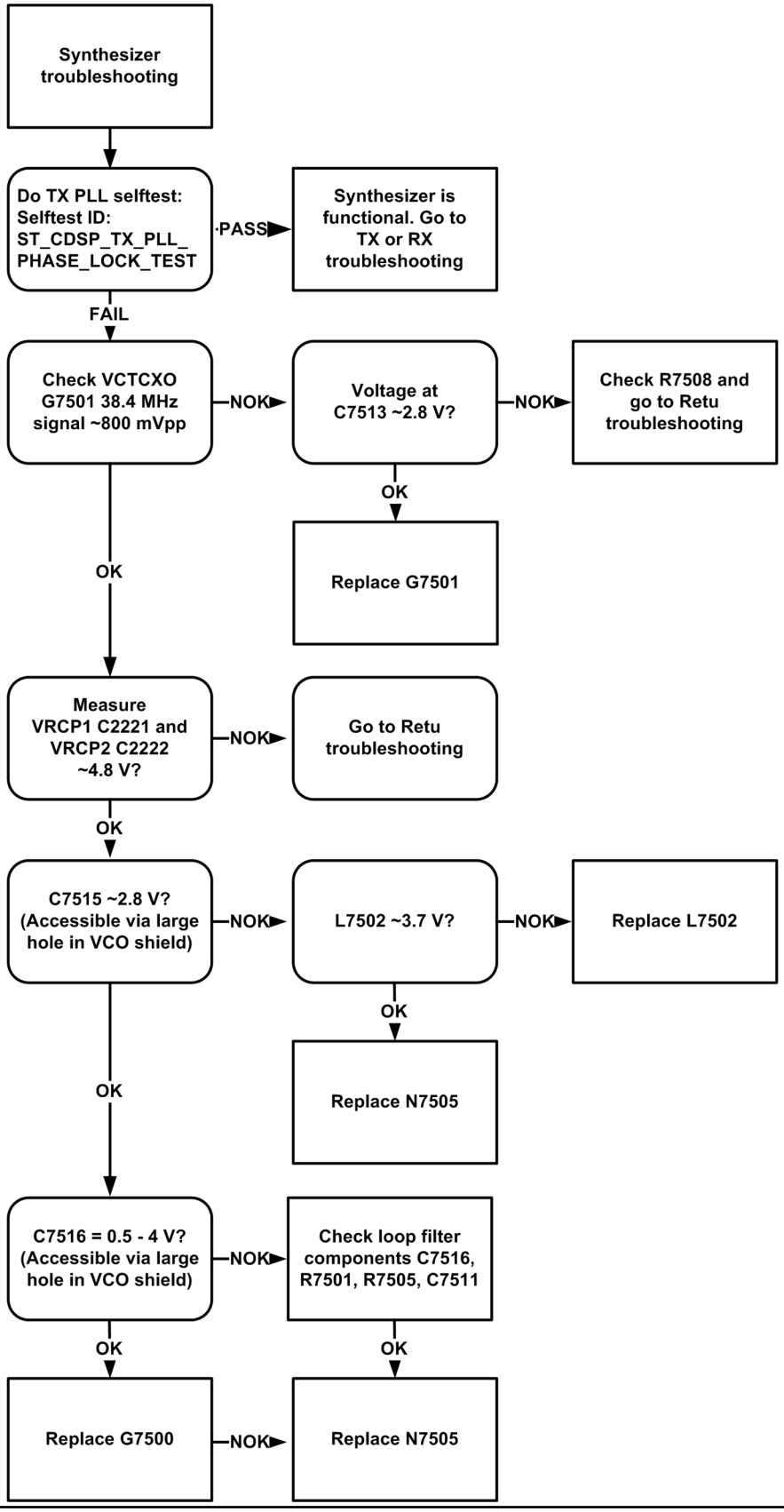
Synthesizer troubleshooting

Synthesizer troubleshooting



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RF tunings

Introduction to RF tunings

Important: Only perform RF tunings if:

- one or more of the RF components have been replaced
- flash Memory chip is replaced or corrupted.

RF calibration is always performed with the help of a product-specific module jig (MJ-62), never with an RF coupler. Using an RF coupler in the calibration phase will cause a complete mistuning of the RF side.

Important: After RF component replacements, **always** use autotuning. Manual tunings are only required in rare cases.

Cable and adapter losses

RF cables and adapters have some losses. They have to be taken in account when the phone is tuned. As all the RF losses are frequency dependent, the user has to be very careful and understand the measurement setup.

For RF attenuations of the module jig, please refer to the Service tools section.

Auto tuning for BB5.0

This phone can be tuned automatically.

Autotune is designed to align the phone's RF part easier and faster. It performs calibrations, tunings and measurements of RX and TX. The results are displayed and logged in a result file, if initiated.

Hardware set up

Hardware requirements for auto tuning:

- PC (Windows 2000/NT) with GPIB card
- Power supply
- Product specific module jig
- Cables: XRF-1 (RF cable), USB cable, GBIP cable and DAU-9S
- Signal analyser (TX), signal generator (RX) and RF-splitter *or* one device including all.

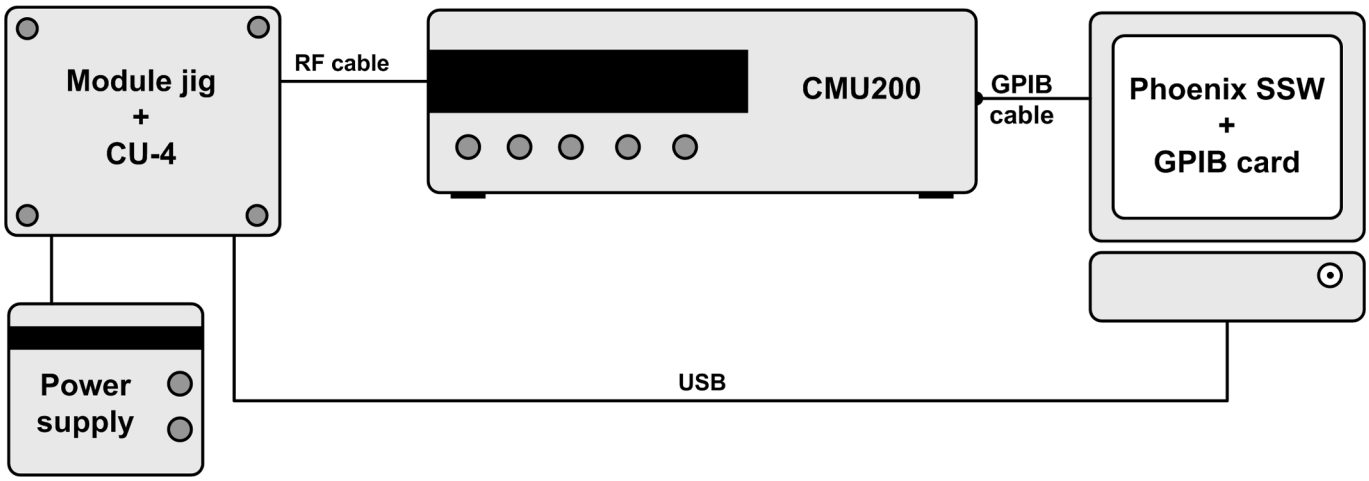

Figure 45 Auto tuning concept with CMU200

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Phoenix preparations

Install the phone specific data package, for example *RM-70_dp_1.78_sw_sh3.26.exe*. This defines phone specific settings..

Auto tuning procedure

1 Make sure the phone (in the jig) is connected to the equipment. Else, some menus will not be shown in Phoenix.

2 To go to autotune, select *Tuning (Alt-U)* > *Auto-Tune (Alt-A)* from the menu.

3 Start autotuning, clicking the *Tune* button.

System mode independent manual tunings

RF channel filter calibration

Context

Rf channel filter calibration tunes the internal low pass filters of the RF ASIC, that limit the bandwidth of BB IQ signals.

Table 12 Rf channel filter calibration tuning limits

	Min	Typ	Max
Tx filter	0	10	31
RX mixer	0	13	31
Rx filter	0	16	31

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→Rf Channel Filter Calibration** .
3. Click **Tune**.
4. To save the values to the PMM (Phone Permanent Memory) area, click **Write**.
5. To close the *Rf Channel Filter Calibration* window, click **Close**.

Results

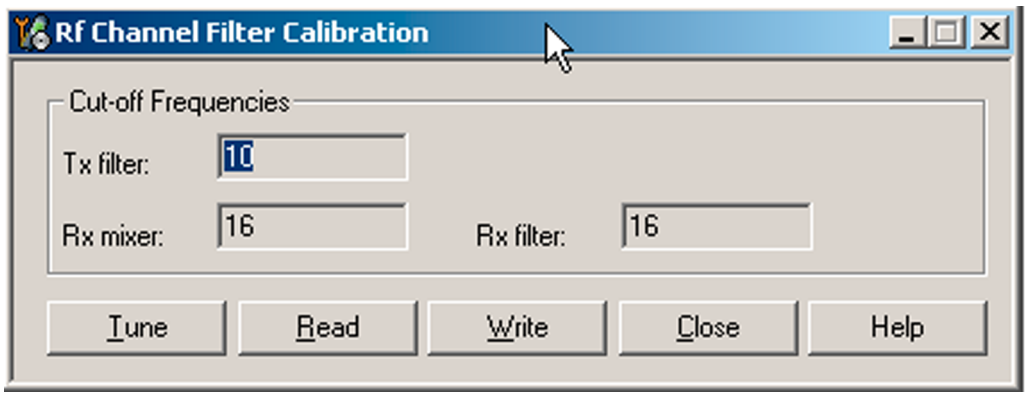

Figure 46 Rf channel filter calibration typical values

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PA (power amplifier) detection

Context

The PA detection procedure detects which PA manufacturer is used for phone PAs.

If a PA is changed or if the permanent memory (PMM) data is corrupted, PA detection has to be performed before Tx tunings.

Steps

1. From the **Operating mode** drop-down menu, set mode to **Local**.
2. Choose **Tuning→PA Detection** .
3. Click **Tune**.
4. Check that the detected PA manufacturers are corresponding to the actual chips on the board.
5. To end the procedure, click **Close**.

GSM receiver tunings

Rx calibration (GSM)

Context

Rx Calibration is used to find out the real gain values of the GSM Rx AGC system and tuning response of the AFC system (AFC D/A init value and AFC slope)

Steps

1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. From the **Operating mode** drop-down menu, set mode to **Local**.
4. Choose **Tuning→GSM→Rx Calibration** .

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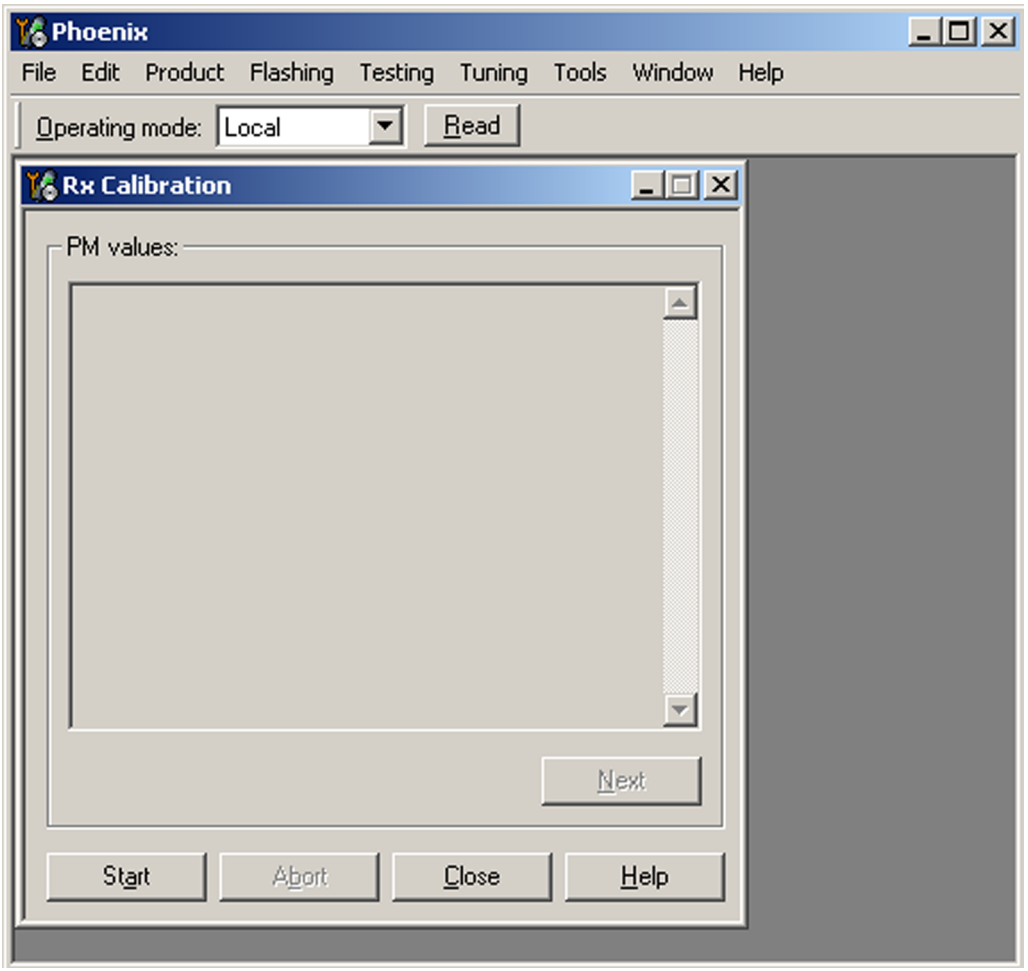
5. Click **Start**.



6. Connect the signal generator to the phone, and set frequency and amplitude as instructed in the **Rx Calibration with band EGSM900** (step 1-3) pop-up window.

   Important: The calibration uses a non-modulated CW signal. Increase the signal generator level by cable attenuation and module jig probe attenuation.

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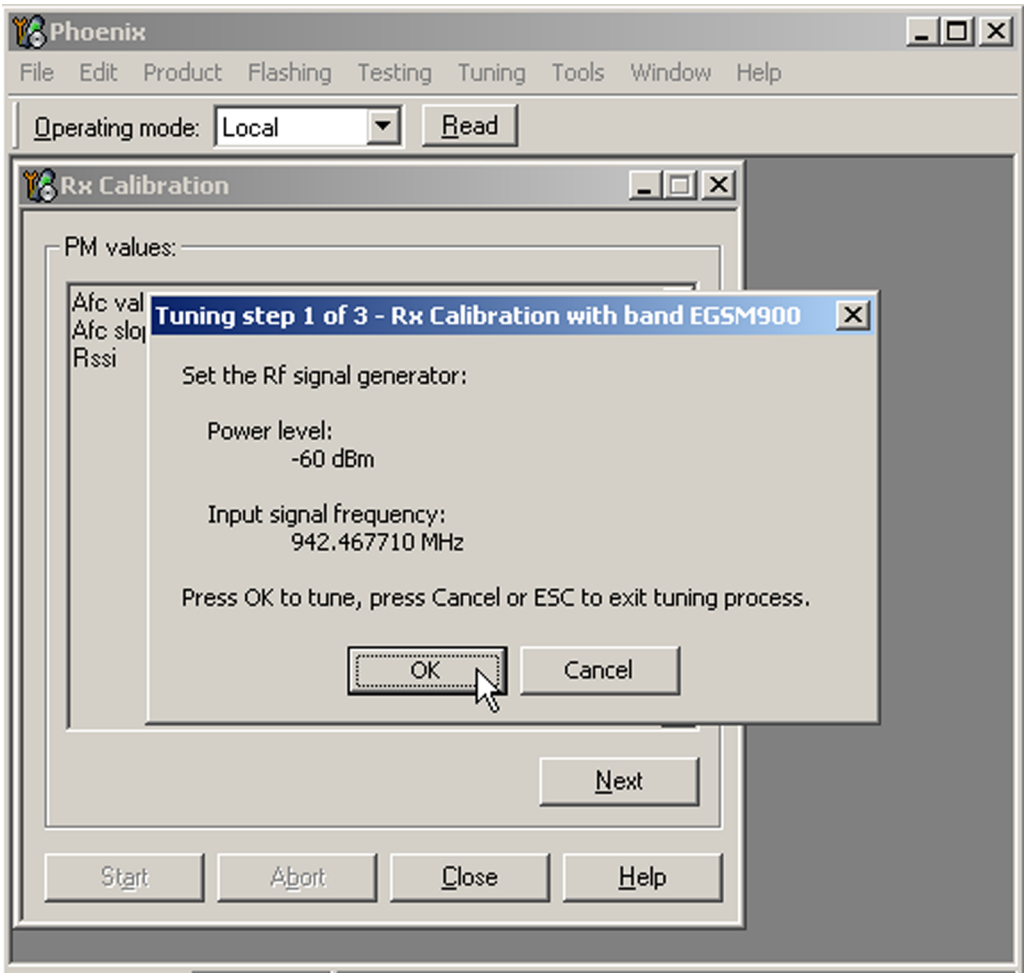

7. To perform the tuning, click **OK**.
8. Check that the tuning values are within the limits specified in the following table:

Table 13 RF tuning limits in Rx calibration

	Min	Typ	Max	Unit
GSM900				
AFC Value	-200	-105...62	200	
AFC slope	0	122	200	
RSSI0	106	107...110	114	dB
GSM1800				
RSSI0	104	104...109	114	dB
GSM1900				
RSSI0	104	104...109	114	dB

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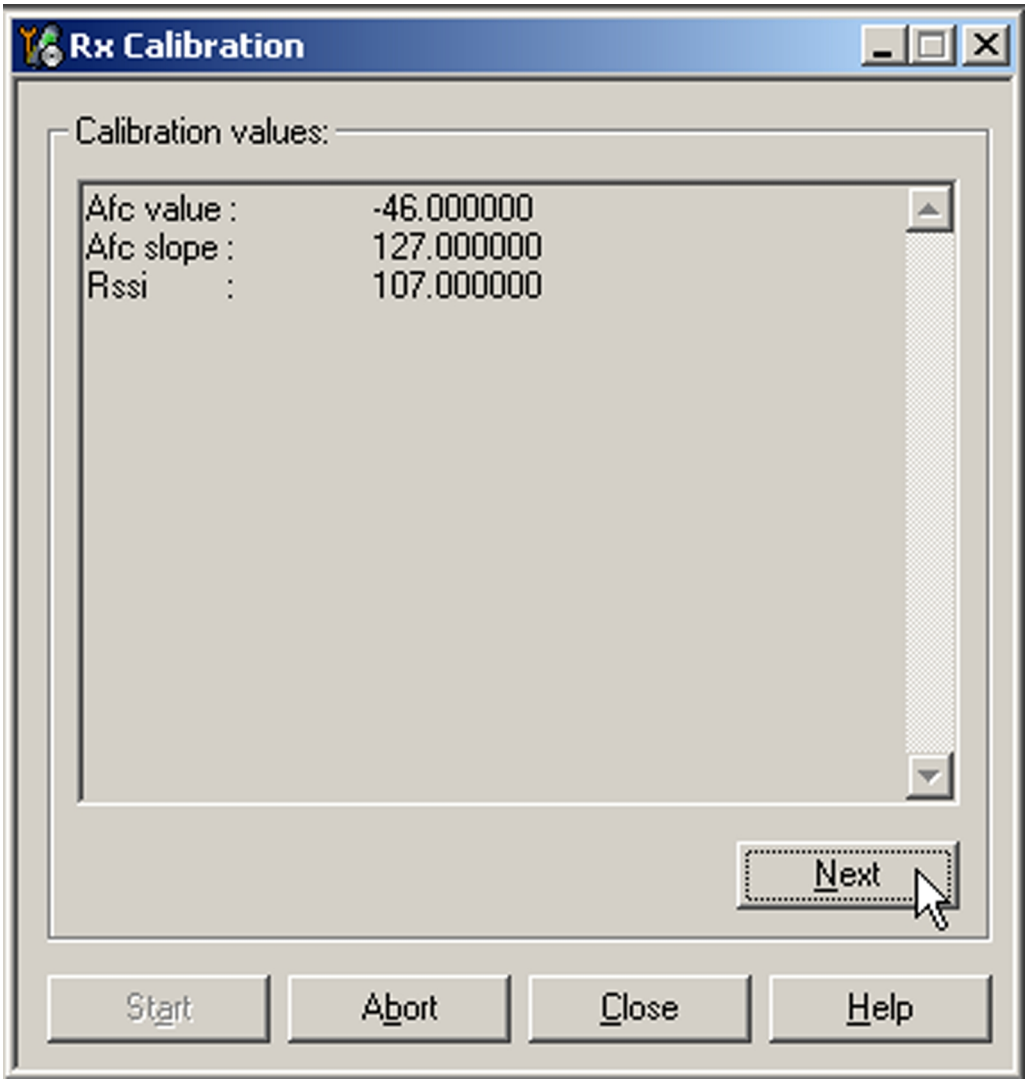
9. Click **Next** to continue with GSM1800 Rx tuning.



Next action

Repeat steps 6 to 9for GSM1800 and GSM1900

Rx band filter response compensation (GSM)

Before you begin

Rx calibration must be performed before the Rx band filter response compensation.

Context

On each GSM Rx band, there is a band filter in front of the RF ASIC front end. The amplitude ripple caused by these filters causes ripple to the RSSI measurement, and therefore calibration is needed.

The calibration has to be repeated for each GSM band.

Steps

1. Connect the GSM connector of the module jig to a signal generator.
2. Start *Phoenix* service software.
3. From the **Operating mode** drop-down menu, set mode to **Local**.

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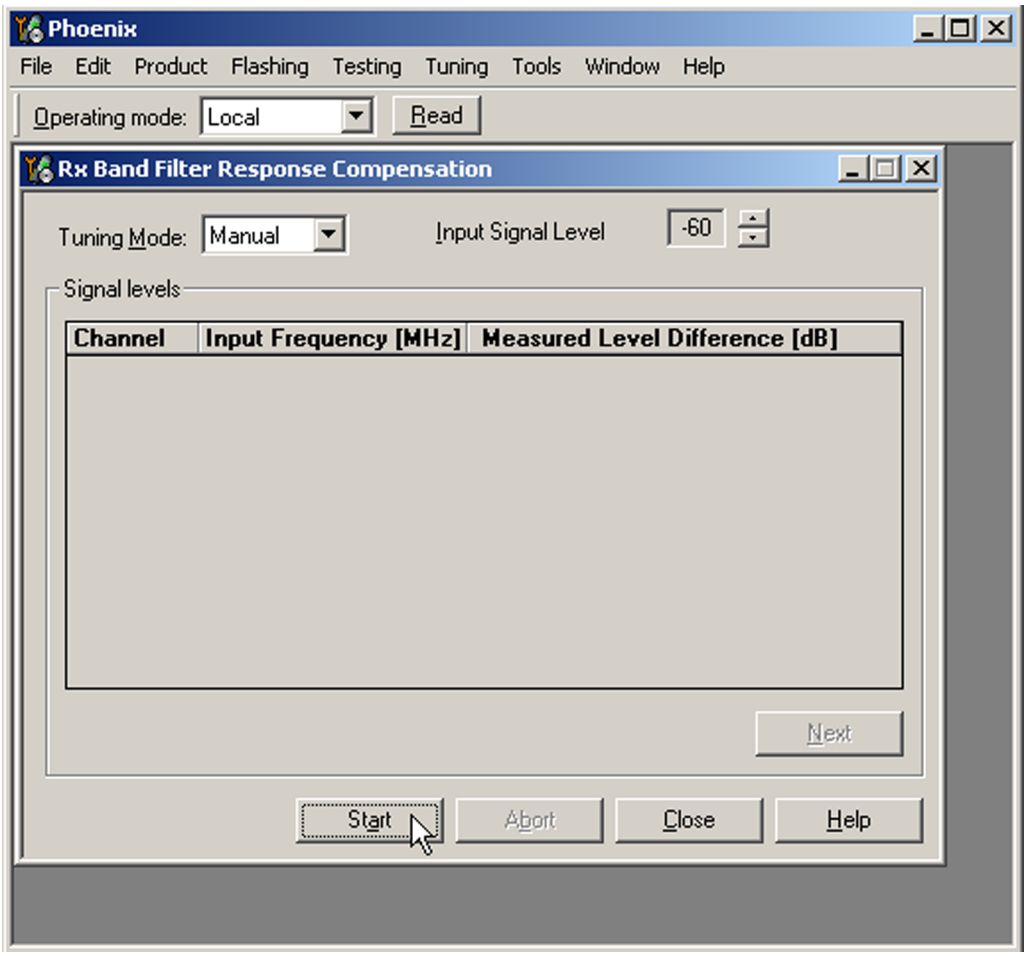
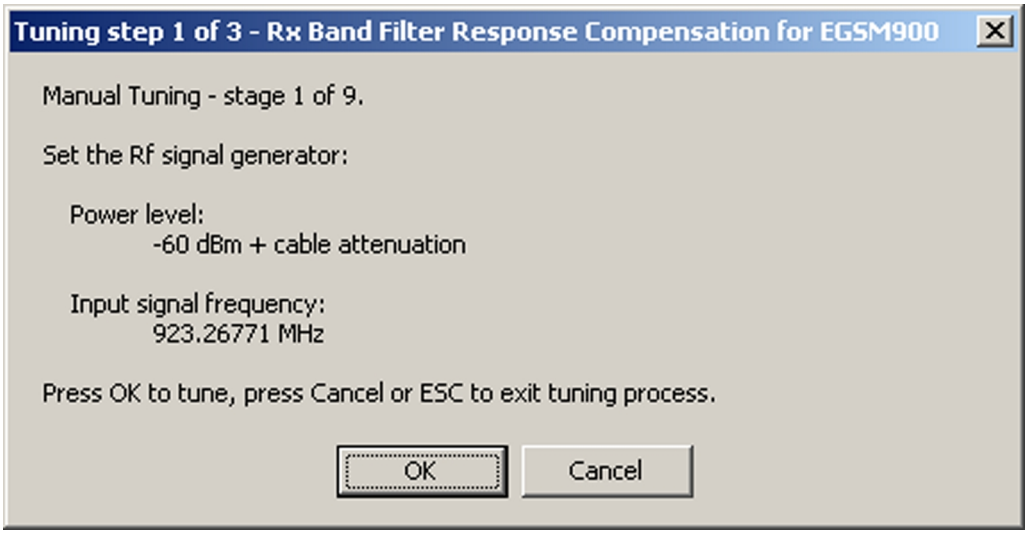
4. Select **GSM900** band.
5. Choose **Tuning→GSM→Rx Band Filter Response Compensation** .
6. Select **Tuning mode: manual**
7. Click **Start**.



8. Connect the signal generator to the phone, and set frequency and amplitude as instructed in the *Rx Band Filter Response Compensation for EGSM900* pop-up window, step 1-3.



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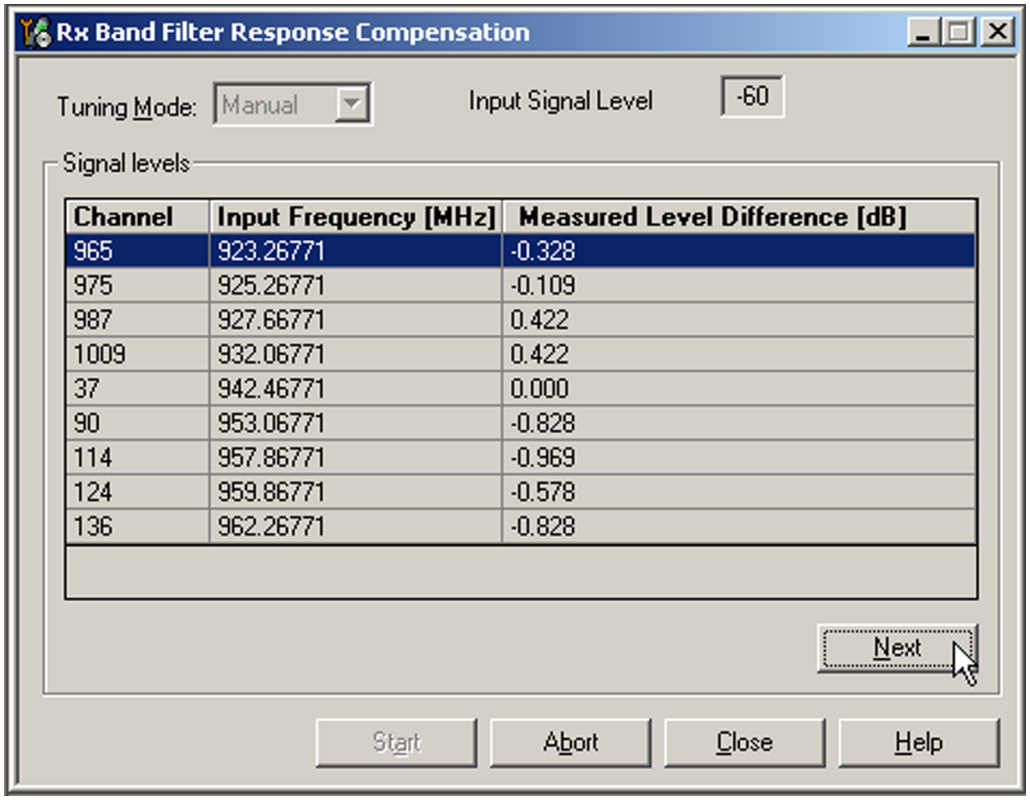
9. To perform tuning, click **OK**.
10. Go through all 9 frequencies. The following table will be shown:



11. Check that the tuning values are within the limits specified in the following table:

	Min	Typ	Max	Unit
GSM900				
Ch. 965 / 923.26771 MHz	-6	-1	2	dB
Ch. 975 / 925.26771 MHz	-3	0	2	dB
Ch. 987 / 927.66771 MHz	-3	0	2	dB
Ch. 1009 / 932.06771 MHz	-2	0	2	dB
Ch. 37 / 942.46771 MHz	-2	0	2	dB
Ch. 90 / 953.06771 MHz	-2	0	2	dB
Ch. 114 / 957.86771 MHz	-3	0	2	dB
Ch. 124 / 959.86771 MHz	-3	0	2	dB

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	Min	Typ	Max	Unit
Ch. 136 / 962.26771 MHz	-6	-1	2	dB
GSM1800				
Ch. 497 / 1802.26771 MHz	-6	-1	3	dB
Ch. 512 / 1805.26771 MHz	-3	0	3	dB
Ch. 535 / 1809.86771 MHz	-3	0	3	dB
Ch. 606 / 1824.06771 MHz	-3	0	3	dB
Ch. 700 / 1842.86771 MHz	-3	0	3	dB
Ch. 791 / 1861.06771 MHz	-3	0	3	dB
Ch. 870 / 1876.86771 MHz	-3	0	3	dB
Ch. 885 / 1879.86771 MHz	-3	0	3	dB
Ch. 908 / 1884.46771 MHz	-6	-1	3	dB
GSM1900				
Ch. 496 / 1927.06771 MHz	-6	-1	2	dB
Ch. 512 / 1930.26771 MHz	-3	0	2	dB
Ch. 537 / 1935.26771 MHz	-3	0	2	dB
Ch. 586 / 1945.06771 MHz	-3	0	2	dB
Ch. 661 / 1960.06771 MHz	-3	0	2	dB
Ch. 736 / 1975.06771 MHz	-3	0	2	dB
Ch. 794 / 1986.66771 MHz	-3	0	2	dB
Ch. 810 / 1989.86771 MHz	-3	0	2	dB
Ch. 835 / 1994.86771 MHz	-6	-1	2	dB

12. If the values are within the limits, click **Next** to continue to the next band.

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Next action

Repeat the steps 8 to 12 for GSM1800 and GSM1900.

GSM transmitter tunings

Tx IQ tuning (GSM)

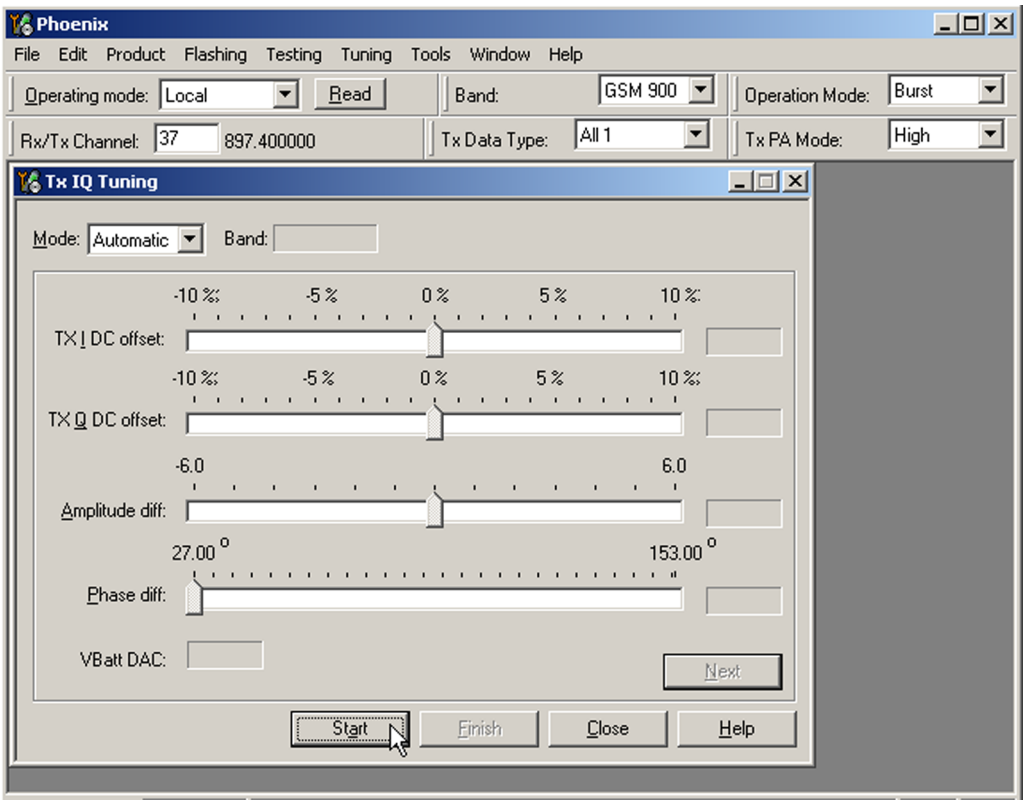
Context

The Tx path branches to I and Q signals at RF I/Q modulator. Modulator and analog hardware located after it cause unequal amplitude and phase disturbance to I and Q signal paths. Tx IQ tuning balances the I and Q branches.

Tx IQ tuning must be performed for all GSM bands.

Steps

1. Start *Phoenix* service software.
2. From the **Operating mode** drop-down menu, set mode to **Local**.
3. Choose **Tuning→GSM→Tx IQ Tuning** .
4. Select **Mode: Automatic**.



5. Select **Band: GSM900** and click **Start**.
6. Click **Next** to start GSM1800 band TX IQ tuning.
7. Click **Next** to start GSM1900 band TX IQ tuning.
8. Click**Finish** and then **Close**.

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Next action

Tuning sliders should be close to the center of the scale after the tuning and within the limits specified in the following table. If they are not within the limits, check Tx IQ quality manually.

	Min	Typ	Max	Unit
GSM900				
I DC offset / Q DC offset	-6	-4	6	dB
Ampl	-1	0	1	dB
Phase	85	90	95	dB
GSM1800/GSM1900				
I/Q DC	-6	0.5	6	dB
Ampl	-1	0	1	dB
Phase	95	100	110	dB

Tx power level tuning (GSM)

Context

Because of variations at the IC (Integrated Circuit) process and discrete component values, the actual transmitter RF gain of each phone is different. Tx power level tuning is used to find out mapping factors called 'power coefficients'. These adjust the GSM transmitter output power to fulfill the specifications.

For EDGE transmission, the bias settings of the GSM PA are adjusted in order to improve linearity. This affects the PA gain and hence the power levels have to be aligned separately for EDGE transmission.

Tx power level tuning has to be performed on all GSM bands.

Steps

1. Connect the phone to a spectrum analyzer.
2. Start *Phoenix* service software.
3. From the **Operating mode** drop-down menu, set mode to **Local**.
4. Choose **Tuning→GSM→Tx Power Level Tuning** .

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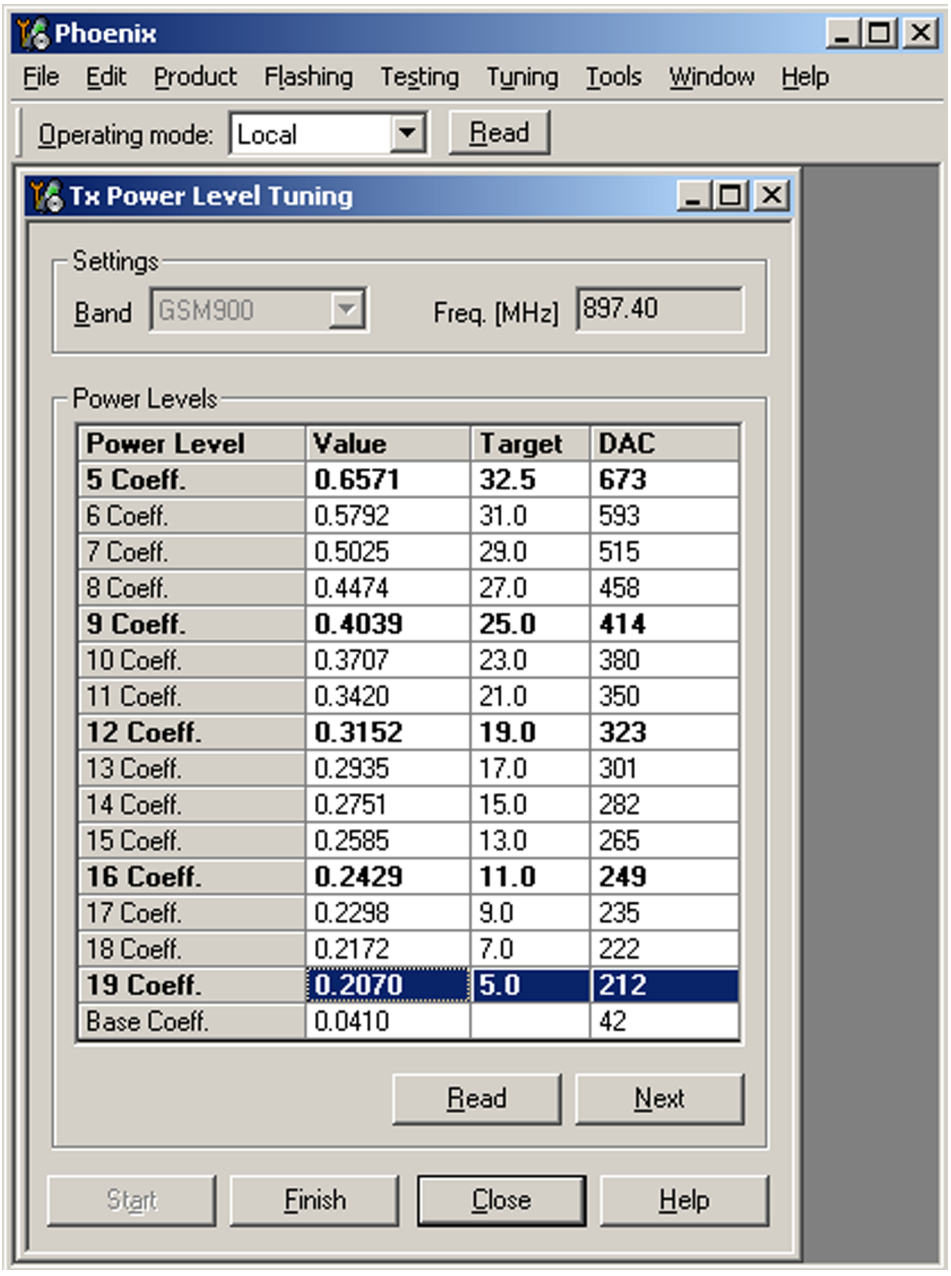
5. Click **Start**.l



6. Set the spectrum analyzer for power level tuning:

Frequency	Channel frequency: • **897.4MHz GSM900** • **1747.8MHz GSM1800** • **1880MHz GSM1900**
Span	0 Hz
Sweep time	2ms
Trigger	Video triggering (-10dBm)
Resolution BW	3MHz
Video BW	3MHz

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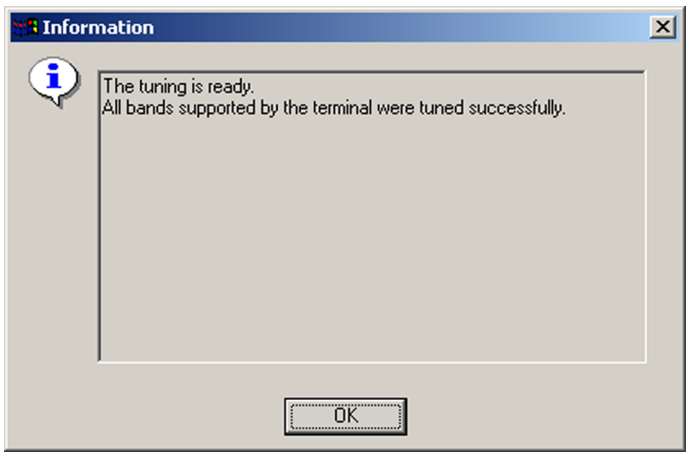
Reference level offset	sum cable attenuation with module jig attenuation
Reference level	33dBm

A power meter with a peak power detector can be also used. Remember to take the attenuations into account.

7. Adjust power for all bold power levels to correspond the **Target dBm** column by pressing **+** or **–** keys.
8. If all bold power levels are adjusted, click **Next** to continue with **GSM900 EDGE**.
9. Adjust power for all bold power levels to correspond the **Target dBm** column by pressing **+** or **–** keys.

Next action

Continue tuning the bold power levels of the GSM1800 and GSM1900 bands. You will see this message, if finished successfully:



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8 — System module

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Phone description

Introduction

This chapter describes the baseband module including engine, power management, interfaces, audio etc.

The baseband is based on BB5.0 with a RAPGSM main processor and Retu/Tahvo energy management. All blocks that require high voltage process are in Tahvo and all other in Retu. The RF part is based on the ASIC Ahne.

RM-70/Nokia 7370 operates on the GSM900/1800/1900 bands.

The phone is a swivel phone, with one main part and one wing board. They are connected with a micro coax cable harness.

Main board includes: BB and RF blocks, Bluetooth, FM radio, HWA, camera, etc.

Wing board includes: LCD display and earpiece

Characteristic components

Function	Name	Item
RF ASIC	Ahne	N7505
Energy management	Retu Tahvo	D2200 N2300
Main processor	RAPGSM	D2800
Memory	Combo: 128 Mbit SDRAM & 256 Mbit NOR flash	D3000
Power amplifier	RF9282	N7520
Antenna		
System connector	PopPort	X2001
Battery	BL-4B, 3.7 V, 700 mAh, Li-ion	
Swivel detection	2 Hall ICs and 2 permanent magnets	
Bluetooth	BC4-ROM	N6030
FM radio	TEA5761, single chip	N6156
Stereo IHF Speaker	13mm ALE	I202
Earpiece	7/11	B2101
Microphone		I203
Vibra		M2100
Charger connector	2 mm Nokia charger interface	X2000
Camera	1.3 Mpix SMIA85, no flash light	X3300

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PWB overview

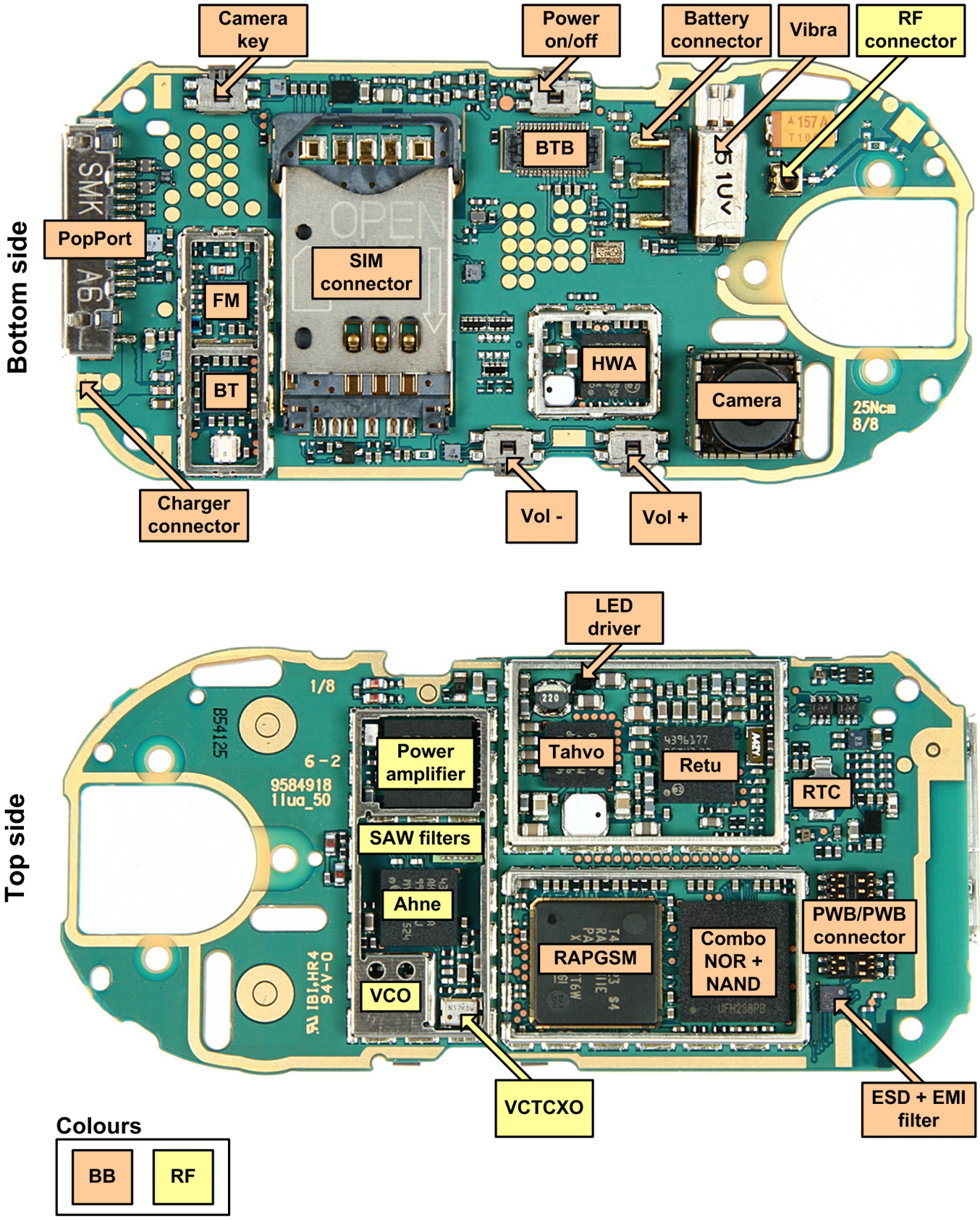

Figure 47 PWB overview

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System block diagram

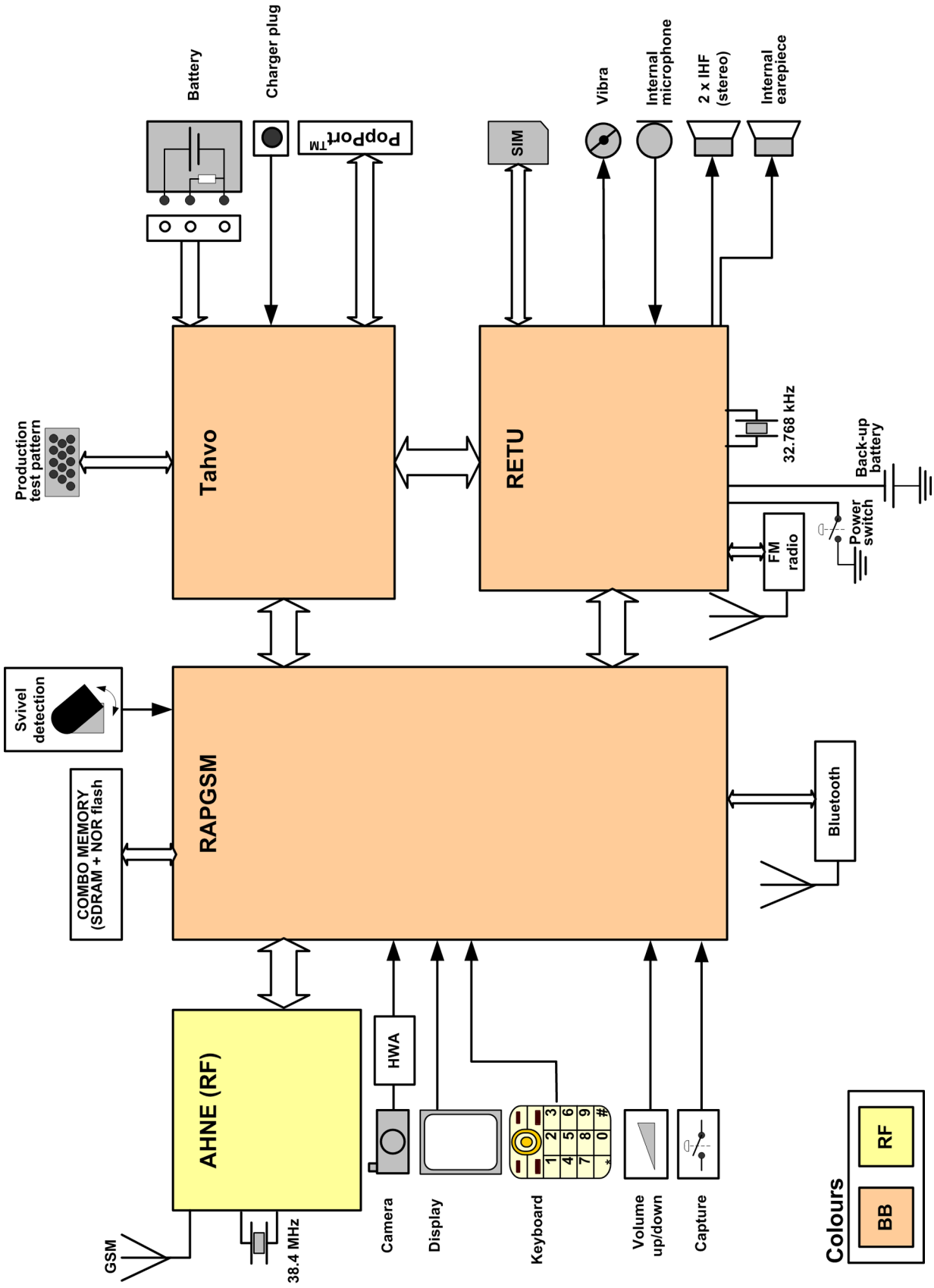

Figure 48 System block diagram

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Board and module connections

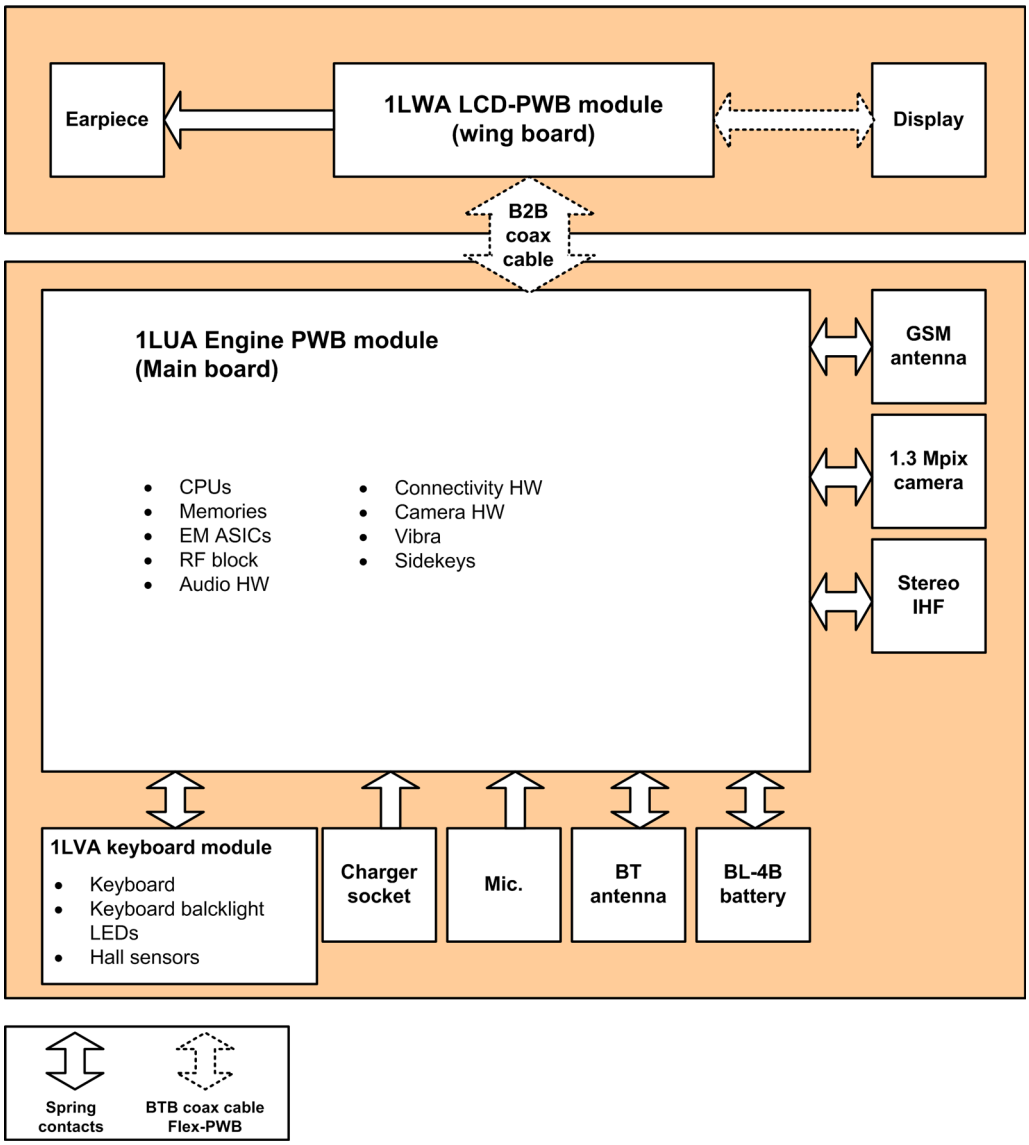

Figure 49 Board and module connections

Engine

Engine modules

The engine contains

- RF module with Ahne ASIC
- Main processor with integrated memory (Baseband)
- Energy management - Retu and Tahvo (Baseband)
- SDRAM and NOR flash memories

RF engine

The RF module performs the high frequency operations of the engine for GSM. In both transmitter and receiver, the modulator and demodulator operate at the channel frequency.

The core components of the RF module are:

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- Ahne RF ASIC (application specific integrated circuit)
- Front end module (FEM) module (Power amplifier and Antenna switch)

The RF engine also includes:

- Voltage controlled oscillators (VCO and VCTCXO)
- SAW filters

The baseband section controls the RF module through the serial bus, RFBus. This passes information about eg. frequency band and mode of operation. Ahne RF ASIC controls the mode of operation, and further sends control signals to the front end module.

In addition to the RFBus there are other interface signals for the power control loop, VCTCXO control and for the modulated waveforms.

Main processor

The main processor in this device is RAPGSM, a BB5.0 ASIC.

Some of its interfaces, processors and controllers are:

- General purpose UARTs
- Processor modules
- I2C (between ICs) interface
- GSM coder
- Interfaces to user interface, SIM and MMC
- Accessory interface
- Handling of RF-BB interface
- I/O voltage = 1.8 V, Core voltage <1.8 V

Energy management

Two ASICs manages the energy in the phone; Retu and Tahvo. Together they cover the analogue audio and energy management function needs.

Tahvo

All blocks that need a special silicon process are included in Tahvo.

Tahvos main features are:

- Energy management control
- Supply voltage generation
- Charge control
- Digital core supply
- Current control for LED supply

Retu

The blocks that do not have special needs are included in Retu.

Retu controls for example:

- Audio block
- SIM
- FM radio

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Modes of operation

The functional behavior can be divided into seven different states. Since the UEMEK controls the regulated power distribution of the phone, each of these states will affect the general functionality of the phone:

- No supply
- Backup
- Power off
- Reset
- Power on
- Deep sleep

Battery and charging

Battery

Note: For technical data, see Battery endurance (page).

This device uses the BL-4B battery, a 700 mAh minimum Li-ion battery. It has a three contacts interface and it is based on a blade type connector.

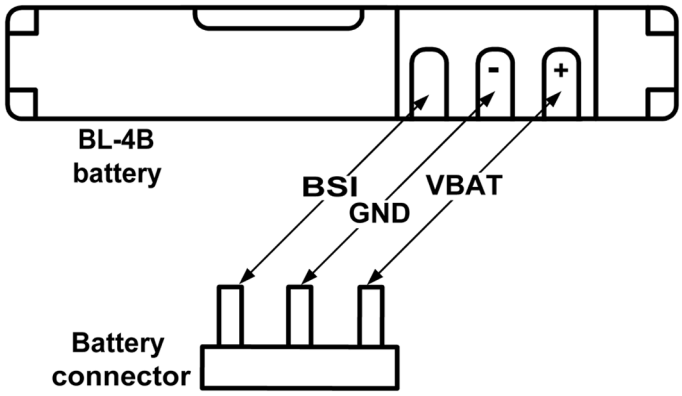

Figure 50 BL-4B battery and battery connector

Battery connector

The battery connector is a blade connector. It has three blades;

- BSI (Battery size indicator)
- GND (Ground)
- VBAT (Battery voltage)

The BSI line is used to recognize the battery capacity by a battery internal pull down resistor.

Figure 51 Blade battery connector

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Charging

This phone is charged through the smaller Nokia standard interface (2.0 mm plug). The old standard charger (3.5 mm) can be used together with the CA-44 charger adapter.

Figure 52 Old (left) and new (right) charger plugs

Charging is controlled by energy management, and external components are needed to protect the baseband module against EMC, reverse polarity and transient frequency deviation.

Test pattern

The production test pattern is placed on the main board, accessible when the battery is removed from the phone. The test points can be used for service and test purposes.

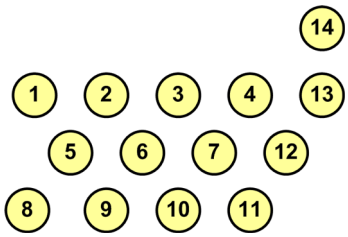

Figure 53 Production test pattern

Pin	Name
1	VBUS
2	TXD/FBUS TX
3	RXD/FBUS RX
4	RXD2
5	VPP
6	CLK/MBUS
7	GND
8	TX1
9	CLK
10	TX0
11	TX2

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Pin	Name
12	RX
13	TX3
14	VBACK

Interfaces

PopPort™ system connector

The PopPort™ connector is an interface between the phone and the accessories. The configuration may vary between different phone models. In this model it includes:

- Audio
- Power out
- Detection/controlling
- USB
- FBus
- Charging

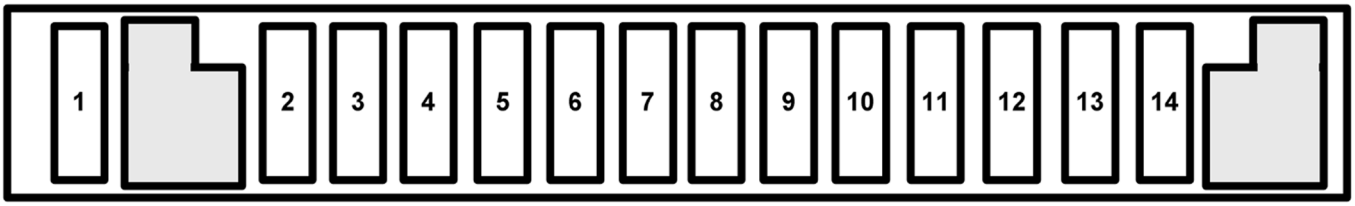

Figure 54 PopPort ™connector pins

Table 14 PopPort™ connector pins and signals

Pin #	Signal	Pin #	Signal
1	Charge	8	USB Data GND
2	Charge GND	9	XMIC N
3	ACI	10	XMIC P
4	Vout	11	XEAR N
5	USB VBus	12	XEAR P
6	USB D+/FBus_RX	13	XEAR RN
7	USB D-/FBus_TX	14	XEAR RP

FM radio

This phone uses a single-chip electronically tuned FM stereo radio with low voltage application.

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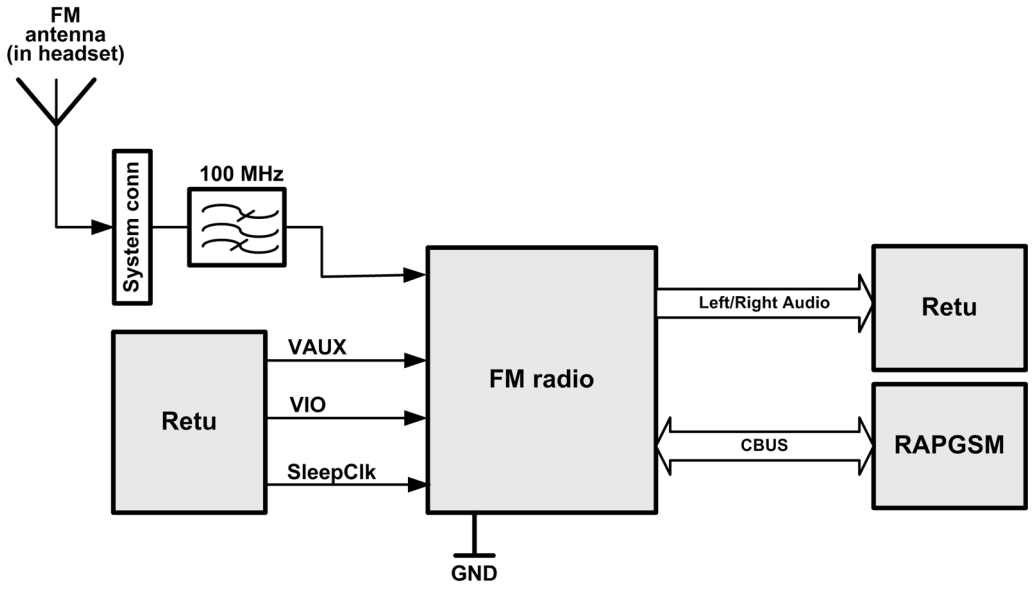

Figure 55 FM radio interface

Camera

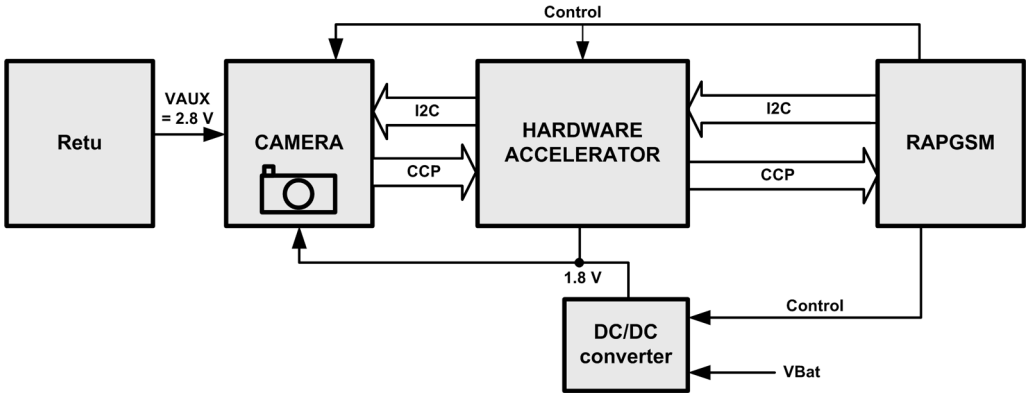

Figure 56 Camera interface

This phone is equipped with a 1.3 megapixel camera. The module has only one operating mode; raw pixel data output.

A hardware accelerator includes features like pixel defect correction, colour interpolation, image sharpness enhancement, selective noise filtering, cropping and scaling. The image can be JPEG-compressed in real-time. The hardware accelerator also performs sensor housekeeping functions such as automatic exposure and white balance controls.

It also controls the triggering of the LED flash, why the accelerator and the LED flash driver are connected directly together.

SIM

The SIM interface is the electrical interface between the SIM card and the mobile phone, located in two ASICs; RAPGSM and Retu.

The interface in Retu contains power up/down, port gating, card detect, data receiving, ATR-counter, registers and level shifting buffers logic.

The data communication between the SIM card and the phone is asynchronous half duplex.

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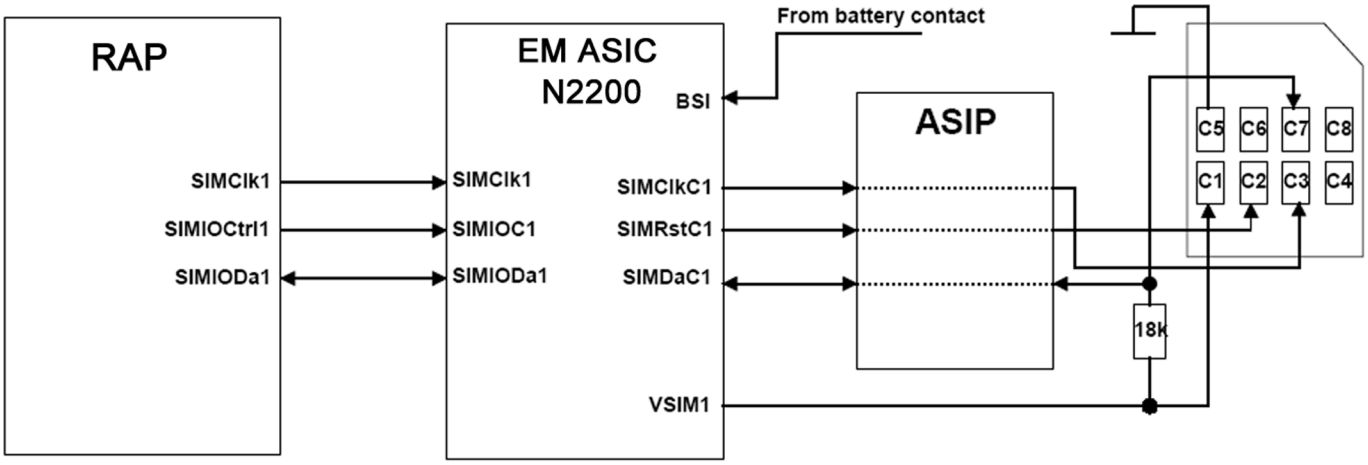

Figure 57 RAPGSM/Retu SIM interface connections

SIM Logic level shifting

The SIM interface can be programmed to support 3V and 1.8V SIM cards. Retu contains a SIM interface called Logic level shifting. A register in Retu selects the supply voltage when the SIM interface is powered down.

SIM Power up/down

The SIM power up/down sequence is generated in Retu. This means that Retu generates the reset switch (RST) signal to the SIM. In addition, the SIMCardDet signal is connected to Retu. The card detection is taken from the SIMCarDet signal. A comparator inside Retu does the monitoring of the SIMCarDet signal. The comparator outputs do not alter state as long as the battery is connected.

The SIM interface is powered up when the SIMCardDet signal indicates “card in”.

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User interface

User interface

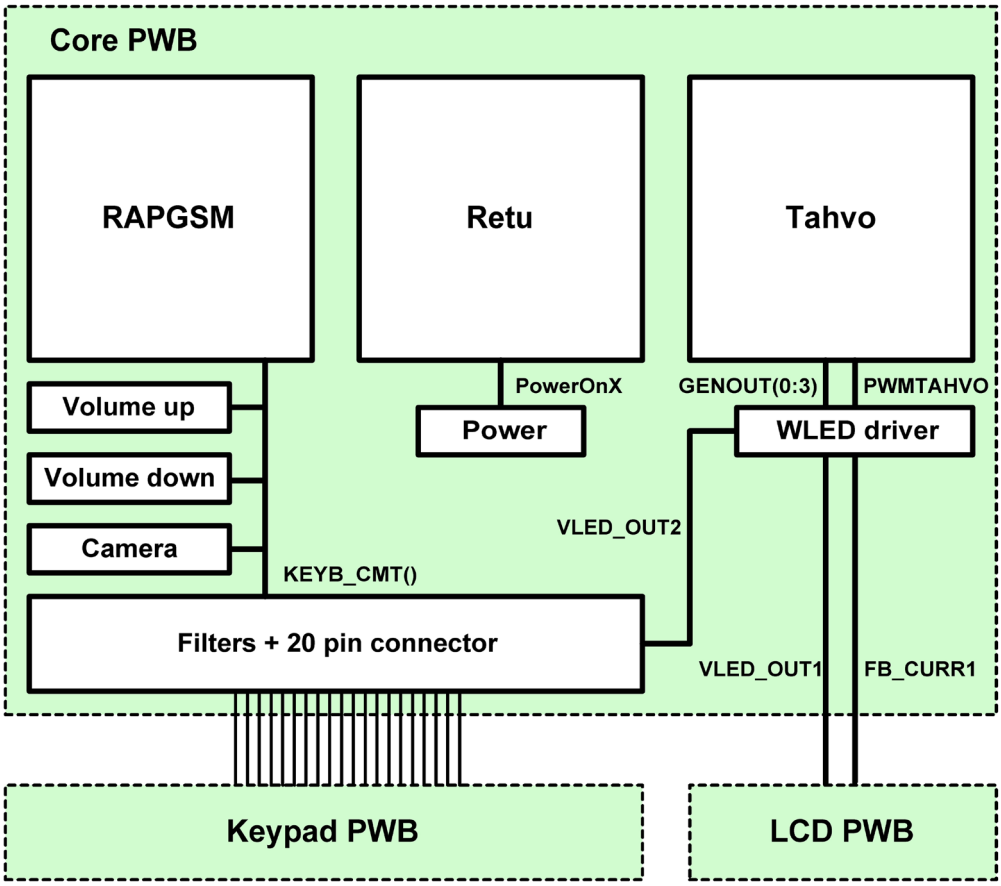

Figure 58 User interface block diagram

Display and display backlight

The display is controlled by RAPGSM, with signal conditioning by serial resistors.

Logic power supply (1.65V-1.95V) is connected to VIO and driver power supply (2.3V-2.9V) is connected to VAUX.

The display includes four white LEDs for display backlights inside of the display module. Display backlight current is monitored using LED driver feedback input

Keyboard and keyboard backlight

This phone has a specific keyboard PWB. Most keys are placed here. Camera, Power and Volume up/down are placed on the main board/Core PWB.

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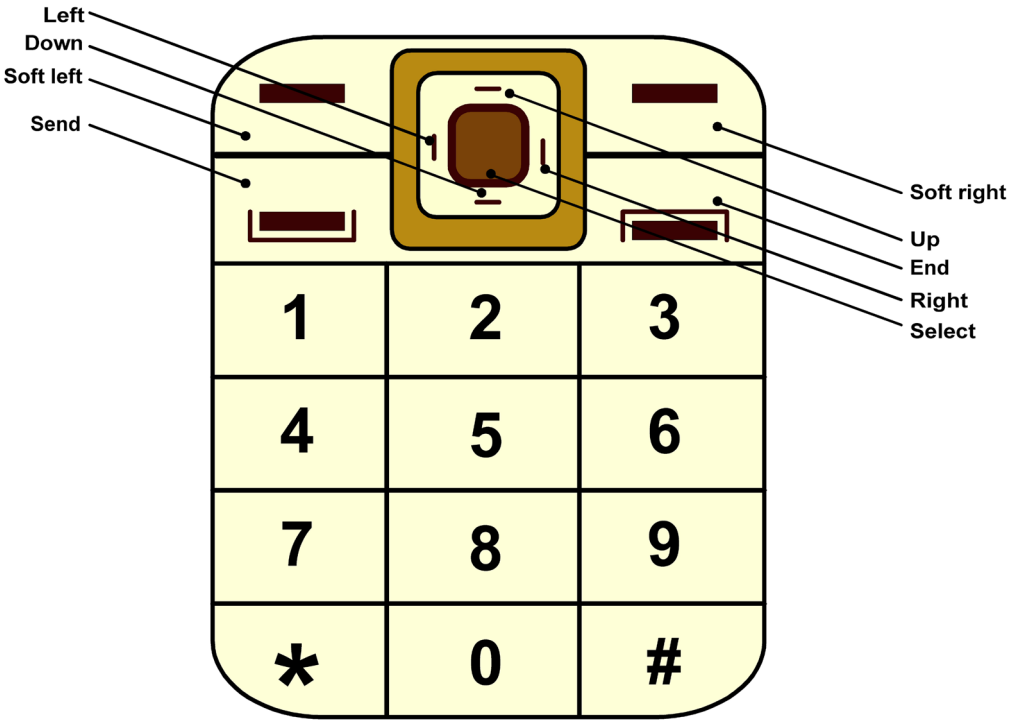

Figure 59 Keyboard layout

Table 15 Key signal matrix

GENIO		39	40	41	42
		KEYB_CMT8 (COL0)	KEYB_CMT9 (COL1)	KEYB_CMT10 (COL2)	KEYB_CMT11 (COL3)
32	KEYB_CMT0 (ROW0)	Soft left	Soft right	Left	Right
33	KEYB_CMT1 (ROW1)	Select	Send	Up	Down
34	KEYB_CMT2 (ROW2)	7	2	3	8
35	KEYB_CMT3 (ROW3)	5	Camera	1	6
36	KEYB_CMT4 (ROW4)	9	*	Vol+	#
37	KEYB_CMT5 (ROW5)	End	0	Vol-	4

There are four white LEDs placed on the keyboard PWB for illumination of the keyboard. Supply source for backlights is implemented using an external white LED driver. The driver increases battery voltage up to 18V. The white LED driver is enabled by Tahvo's PWM300 output. PWMTAHVO (PWM300) is SW controlled pulse width modulated (PWM) output.

Keyboards backlight LEDs are current controlled and switchable via TAHVO GENOUT3.

Swivel switch

The detection of the position of the swivel is made through two Hall sensors, connected to GENIO44, and two magnets. The magnets are positioned in the upper block in the swivel construction. The output of the Hall sensor is connected to GND.

When the swivel is opened, the applied magnetic field is high. This is sensed by an internal switch, also connected to GND. When the construction is closed, at least one of the two Hall sensors is fluxed by magnetic field.

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Audio concept

Audio hardware architecture

The functional core of the audio hardware is built around two ASICs: RAPGSM engine ASIC and the mixed-signal ASIC Retu.

Retu provides an interface for the transducers and the accessory connector. Integrated hands free stereo speakers are driven by a D-class audio amplifier.

There are four audio transducers:

- Dynamic earpiece
- Two dynamic speakers
- Microphone module

In addition to the audio transducers, Retu also provides an output for the dynamic vibra component.

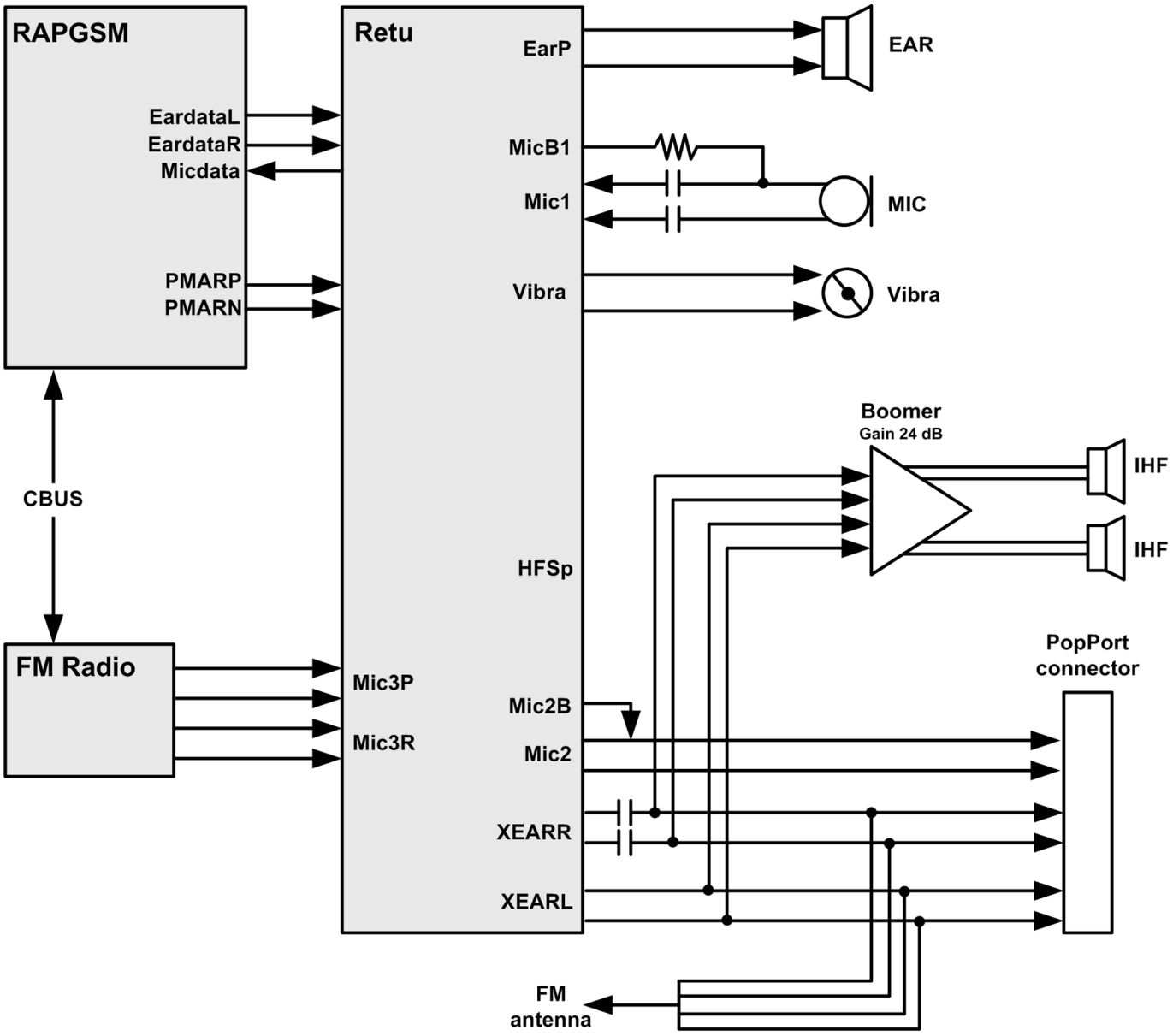

Figure 60 Audio block diagram

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Internal microphone

Internal microphone is used for HandPortable (HP) and Internal HandsFree (IHF) call modes.

An analogue electret microphone is connected to N2200 Mic1P and Mic1N inputs via asymmetric electrical connection.

The microphone is biased by N2200 MicB1 bias voltage output.

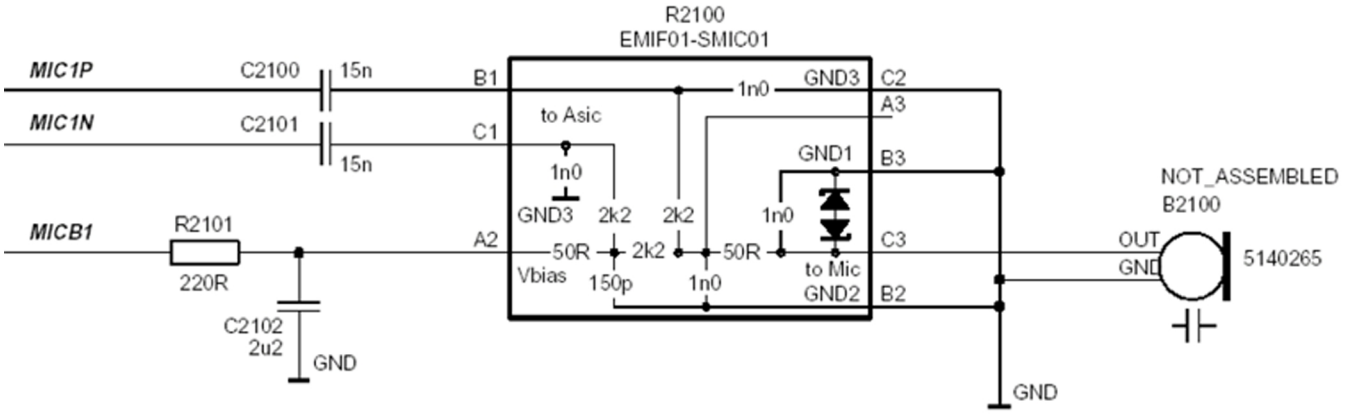

Figure 61 Internal microphone circuitry

External microphone

Galvanic accessories are connected to the system connector (Pop-Port™).

Accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

External microphone circuitry is biased by Retu ASIC MicB2 bias voltage output. The circuitry provides a symmetrical connection for the microphone from the Pop-Port™connections, XMICN and XMICP, to Retu ASIC inputs, Mic2P and Mic2N.

Internal earpiece

Internal earpiece is used for the HandPortable (HP) call mode. A dynamic earpiece capsule is connected to Retu's differential output EarP and EarN.

Internal speakers

Internal speakers are used for Internal HandsFree (IHF) call mode, ringing tones, FM-radio and music listening.

Two dynamic 13mm speakers are connected to Retu ASIC's outputs XearR/XearL via stereo D-class IHF amplifier TPA2012D2.

The amplifier has 24 dB fixed gain and it is put to shutdown mode when not in use.

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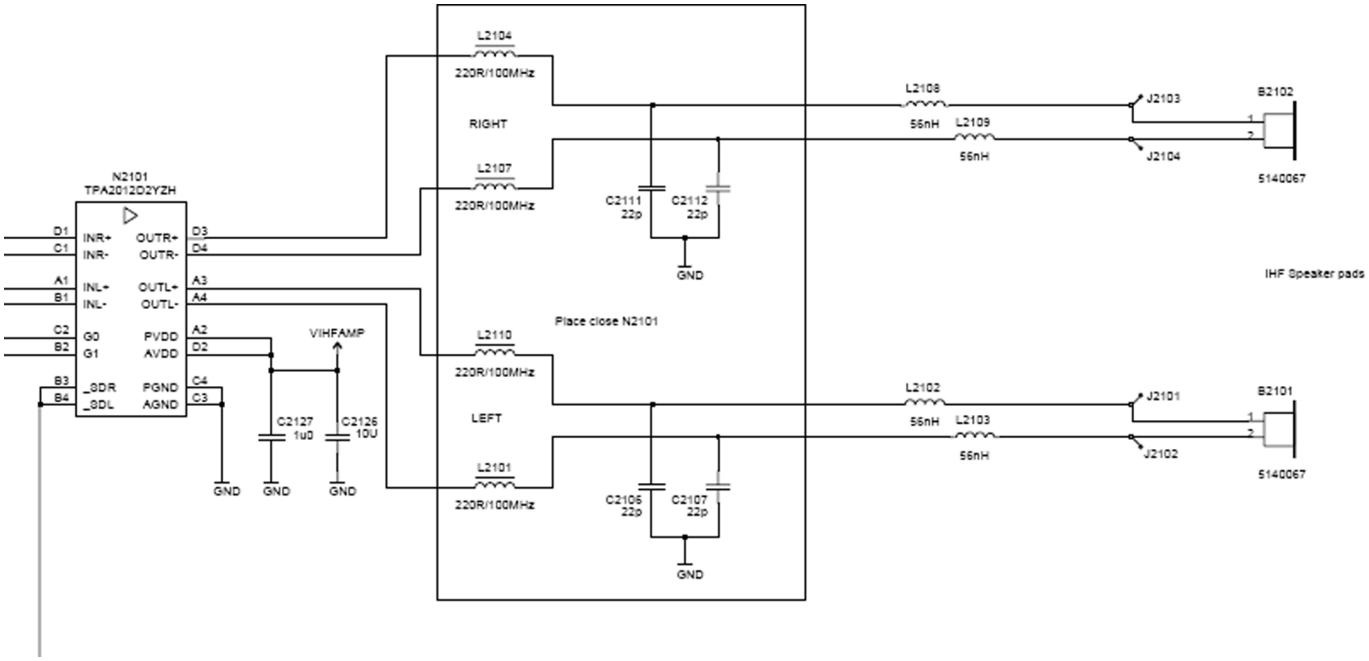

Figure 62 Internal speaker circuitry

External earpiece

All galvanic accessories are connected to the system connector (Pop-Port™).

The accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

Retu ASIC provides two output channels in either single-ended or differential format. Retu ASIC outputs XearL and XearLC form the left channel audio output, and XearR and XearRC the right channel audio output. XearLC and XearRC are the ground pins if the output works in a single-ended operation.

In the Pop-Port™ side, HSEAR P and HSEAR N form the left channel output, and HSEAR R P and HSEAR R N the right channel output. Respectively, HSEAR N and HSEAR R N are the ground pins if the output works in a single-ended operation.

Analogue switches are in the Xear lines to attenuate the headset signal level in IHF mode, when headset is inserted. The attenuation is about 15 dB.

Vibra circuitry

Vibra is used for vibra-alarm function.

The vibra motor is connected to the Retu ASIC VibraP and VibraN Pulse Width Modulated (PWM) outputs.

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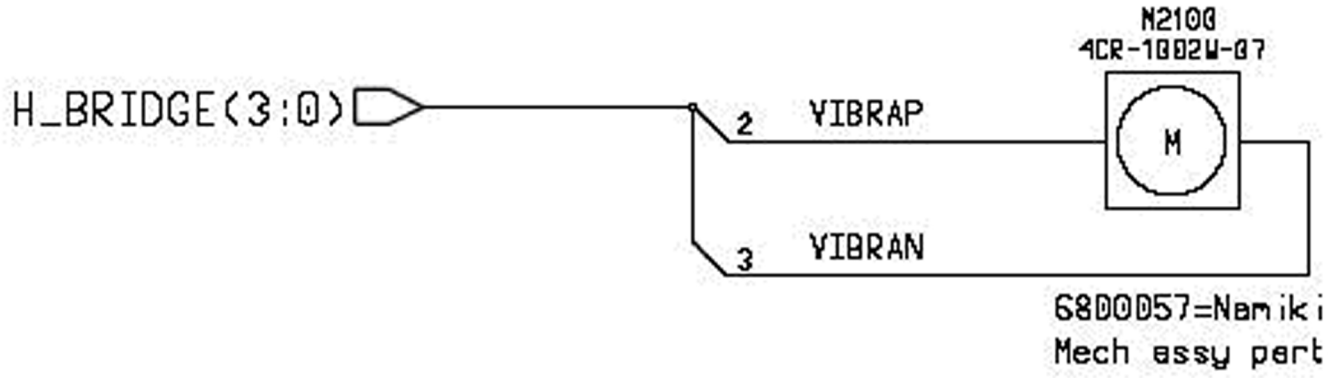

Figure 63 Vibra circuitry

Connections

USB interface

USB (Universal serial bus) provides a wired connectivity between host PC and peripheral devices.

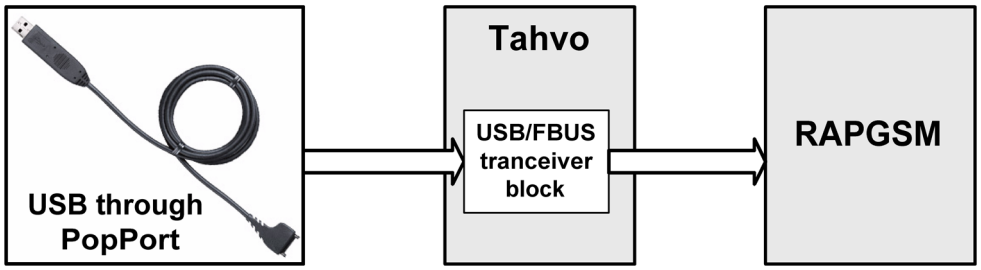

Figure 64 USB interface to engine

The Nokia USB device solution is supported using the Wireless 2 Function Controller (W2FC) core. This core is included in the RAPGSM. The core completes several USB functions automatically and is controlled by the MCU. .

The USB signal ESD protection and line matching resistance, and USB pull-up resistor is included to the USB ASIP. This component also includes ESD protection for VOUT and ACI Pop-Port pins.

The USB solution is also compatible with USB 2.0, with a full speed of 12 Mbps.

Bluetooth

Bluetooth provides a fully digital link for communication between a master unit and one or more slave units.

This bluetooth solution is a single chip solution. The baseband interface to the bluetooth has a separate PCMbus for audio giving in total 12 connections;

- 4 pins used for UART (data)
- 4 pins for PCM audio and
- 4 pins for control (Host wake-up, BT wake up, BT reset and PURX).

Bluetooth connects to RAPGSM on the GENIO and GPIO busses.

The Bluetooth module is provided with power from VBat.

Bluetooth is enabled by PURX, which is an internal Retu reset signal. This signal is high whenever the phone is powered on.

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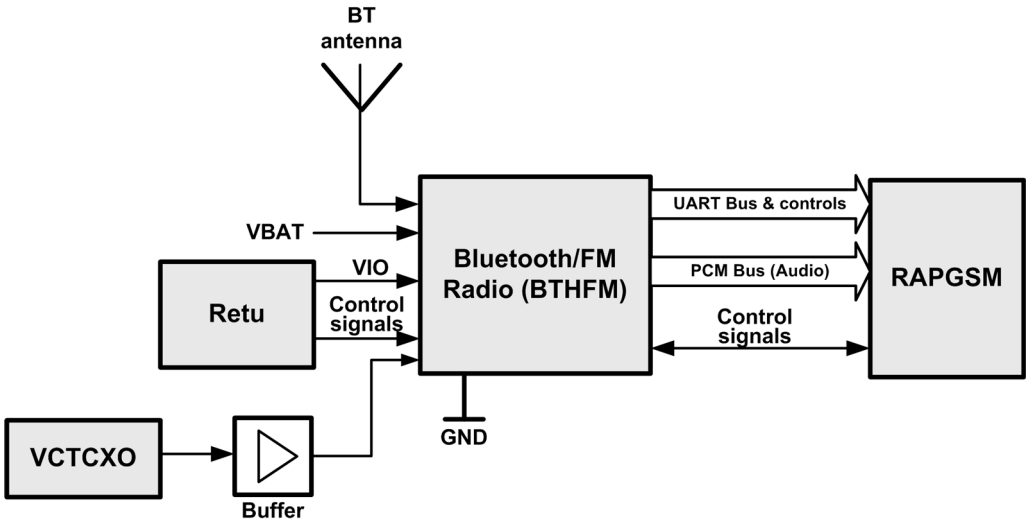

Figure 65 Bluetooth interface block diagram

Technical specifications

General specifications

Unit	Dimension (mm)	Weight (g)	Volume (cc)
Transceiver with BL-4B 700 mAh Li-Ion battery pack	88x43x23	104 g	76 cc

Battery endurance

Battery	Talk time	Standby time
BL-4B 700 mAh Li-ion	2.9 hours (RM-70)	Up to 8 days

Note: Variation in operation times will occur depending on SIM card, network settings and usage. Talk time is increased by up to 30% if half rate is active, and reduced by 5% if enhanced full rate is active.

Environmental conditions

Temperature

Temperature range	Min ºC	Max ºC
Operational (all specs met)	-5	+55
Functional (reduced performance)	-30	+70
Storage	-30	+85

The HW module complies with the SPR4 Operating Conditions.

Humidity

Relative humidity range is 5...95%.

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The hardware module is not protected against water. Condensed or splashed water might cause malfunction. Any submerge of the phone will cause permanent damage. Long-term high humidity, with condensation, will cause permanent damage because of corrosion.

The hardware module complies with the SPR4 Operating Conditions.

Electrical characteristics

Table 16 Normal and extreme voltages

Voltage	Voltage (V)	Condition
General conditions		
Nominal voltage	3.700	
Lower extreme voltage	3.145	a
Higher extreme voltage	4.230	b
HW shutdown voltages		
Vmstr+	2.1 ± 0,1	Off to on
Vmstr-	1.9 ± 0,1	On to off
SW shutdown voltages		
SW shutdown	3.1	In call
SW shutdown	3.2	In idle
Min operating voltage		
Vcoff+	3. 1 ± 0,1	Off to on
Vcoff-	2. 8 ± 0,1	On to off

a. ADC settings in the SW might shutdown the phone above this value.

b. During fast charging of an empty battery, this voltage might exceed this value. Voltages between 4.20 and 4.60 might appear for a short while.

Main RF characteristics

Table 17 Channel numbers and frequencies

System	Channel number	TX frequency	RX frequency	Unit
GSM900	0 < =n <= 124	F = 890 + 0.2*n	F = 935 + 0.2*n	MHz
	975 <= n <= 1023	F = 890 + 0.2* (n - 1024)	F = 935 + 0.2*(n -1024)	MHz
GSM1800	512 <= n <= 885	F = 1710.2 + 0.2* (n - 512)	F = 1805.2 + 0.2* (n-512)	MHz
GSM1900	512 <= n <= 810	F = 1850.2 + 0.2* (n - 512)	F = 1930.2 + 0.2* (n-512)	MHz

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Table 18 Main RF characteristics

Parameter	Unit and value
Cellular systems	EGSM900/GSM1800/GSM1900
RX Frequency range	EGSM900: 925 ... 960 MHz
	GSM1800: 1805...1880 MHz
	GSM1900: 1930...1990 MHz
TX Frequency range	EGSM900: 880 ... 915 MHz
	GSM1800: 1710 ...1785 MHz
	GSM1900: 1850...1910 MHz
Duplex spacing	EGSM900: 45 MHz
	GSM1800: 95 MHz
	GSM1900: 80 MHz
Channel spacing	200 kHz
Number of RF channels	EGSM900: 174
	GSM1800: 374
	GSM1900: 300
Output Power	EGSM900: GSMK 5...33 dBm
	EGSM900: 8-PSK 5...27 dBm
	GSM1800: GSMK 0...30 dBm
	GSM1800: 8-PSK 0...26 dBm
	GSM1900: GSMK 0...30 dBm
	GSM1900: 8-PSK 0...26 dBm
Number of power levels GMSK	EGSM900: 15
	GSM1800: 16
	GSM1900: 16
Number of power levels 8-PSK	EGSM900: 12
	GSM1800: 14
	GSM1900: 14

Table 19 Transmitter characteristics

Item	Values
Type	Direct conversion, nonlinear, FDMA/TDMA
LO frequency range	EGSM900: 3520...3660 MHz (4 x TX freq)
	GSM1800: 3420...3570 MHz (2 x TX freq)
	GSM1900: 3700...3820 MHz (2 x TX freq)
Output power	GMSK 33/30/30 dBm

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Item	Values
(EGSM900/GSM1800/GSM1900)	8-PSK 27/26/26 dBm

Table 20 Receiver characteristics

Item	Values
Type	Direct conversion, Linear, FDMA/TDMA
LO frequencies	EGSM900: 3700...3840 MHz (4 x RX freq)
	GSM1800: 3610...3760 MHz (2 x RX freq)
	GSM1900: 3860...3980 MHz (2 x RX freq)
Typical 3 dB bandwidth	+/- 91 kHz
Sensitivity	min. - 102 dBm (normal condition)
Total typical receiver voltage gain (from antenna to RX ADC)	86 dB
Receiver output level (RF level -95 dBm)	230 mVpp, single-ended I/Q signals to RX ADCs

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9 — Schematics

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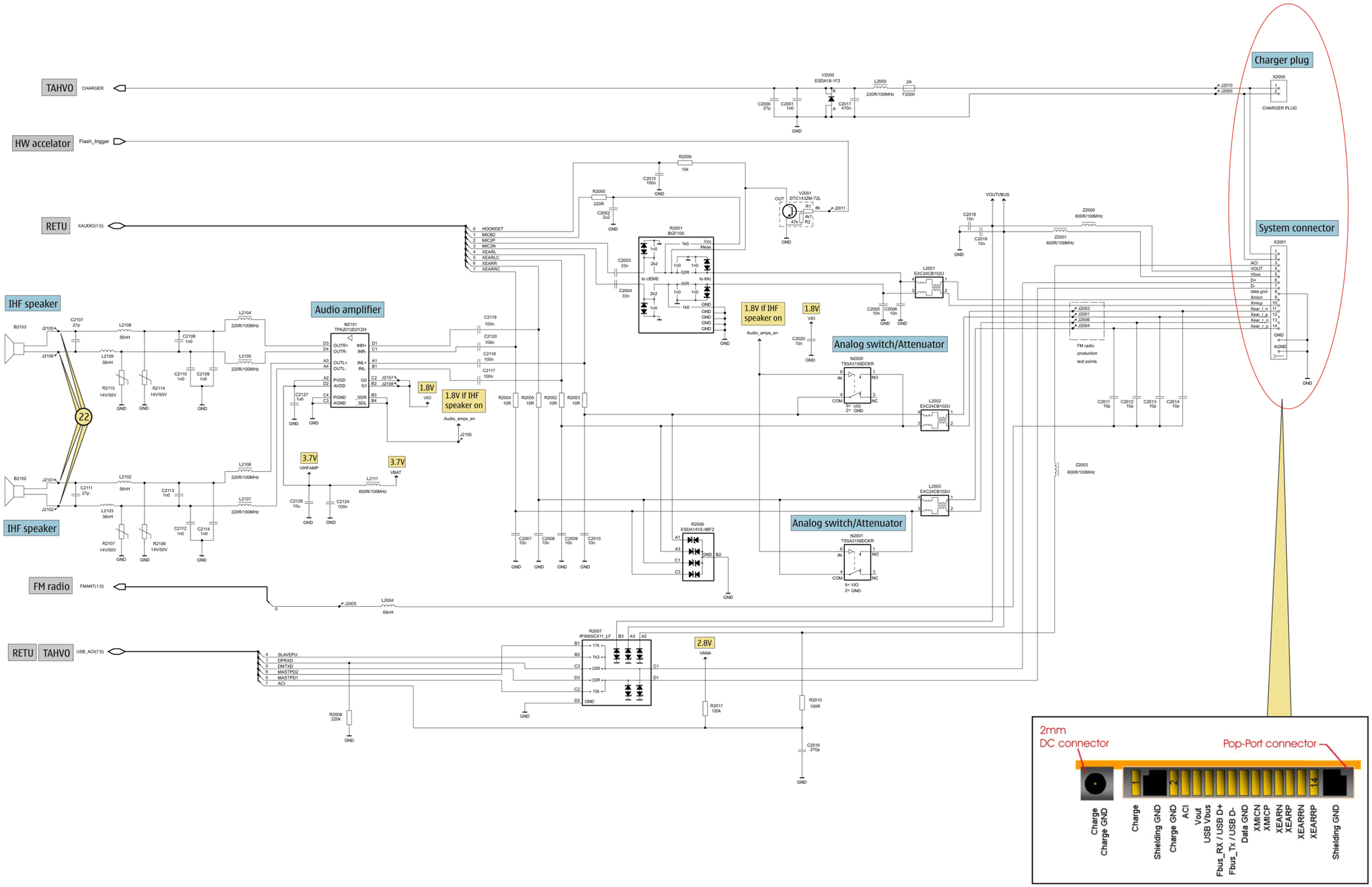
Schematics

System connector, IHF speaker



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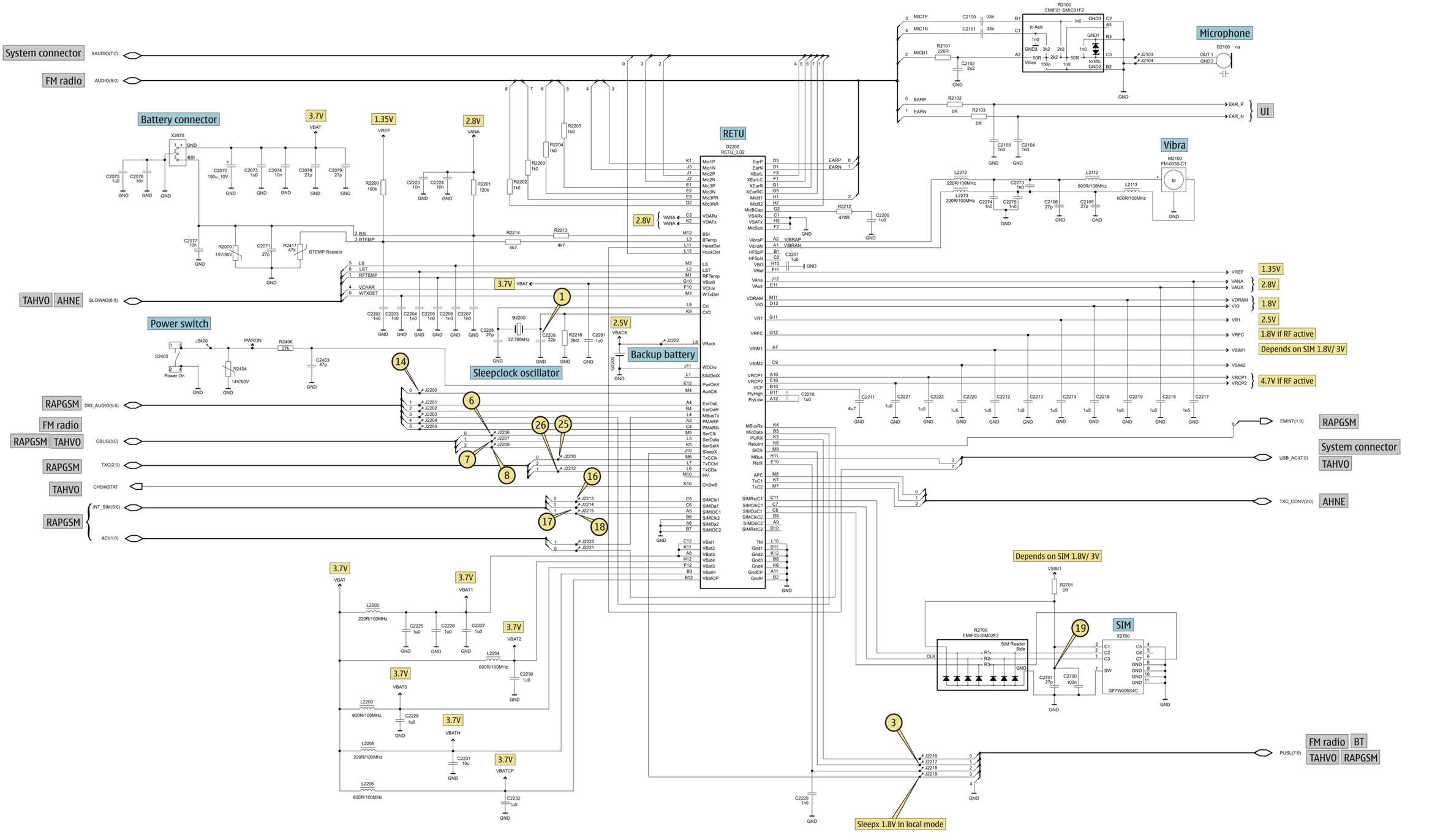
RETU, SIM, Micro, Vibra



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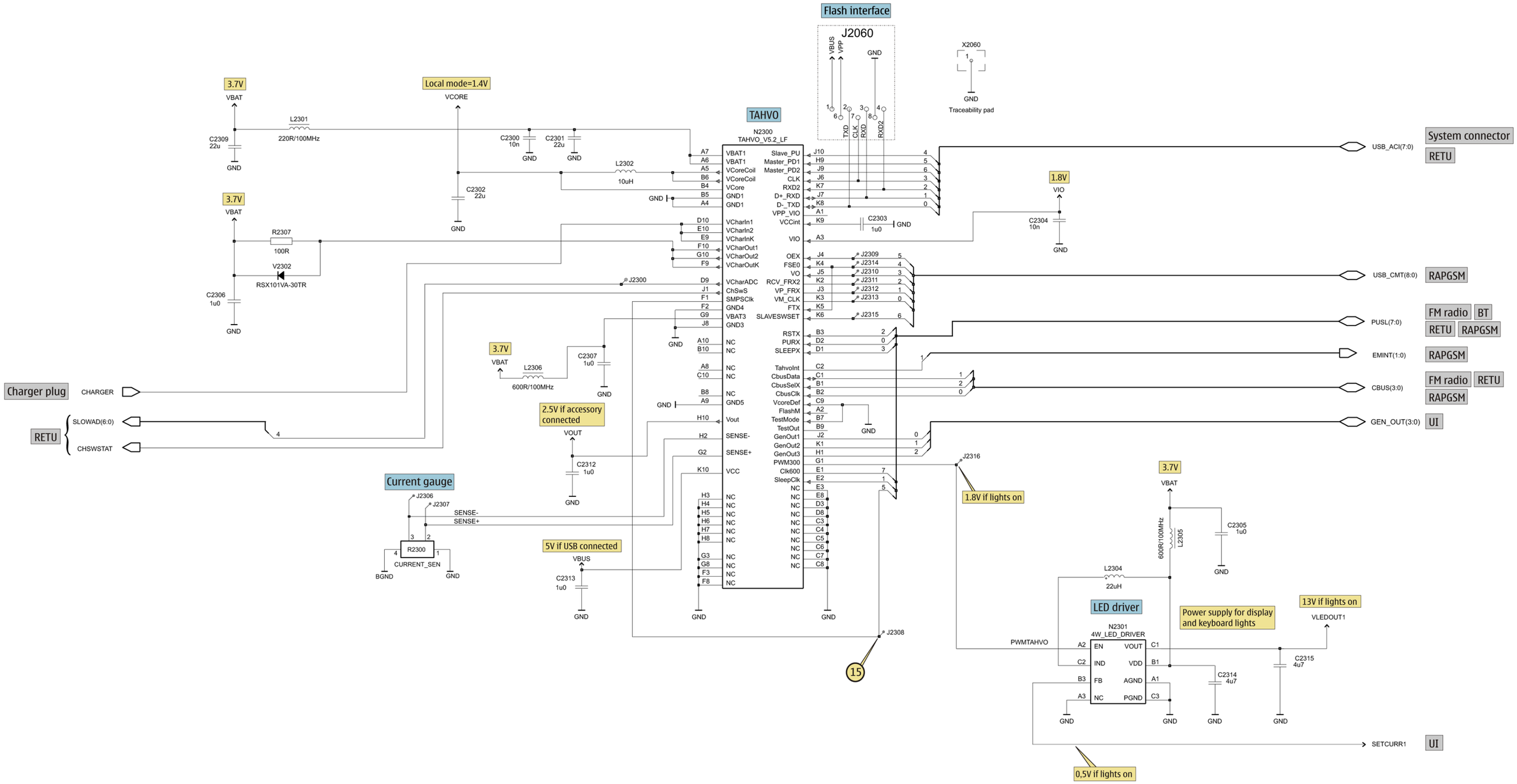
TAHVO



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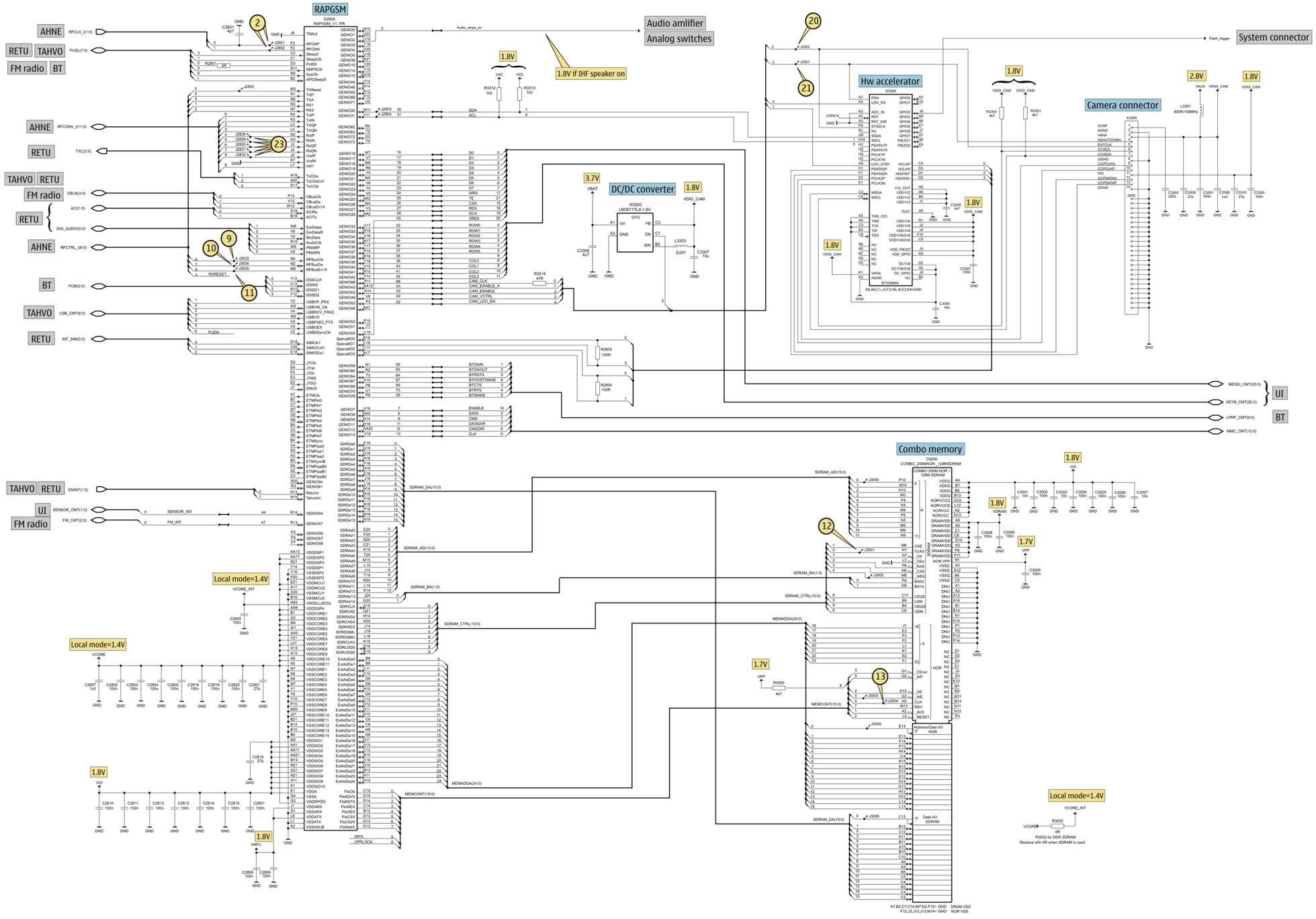
RAPGSM, Combo memory, Camera



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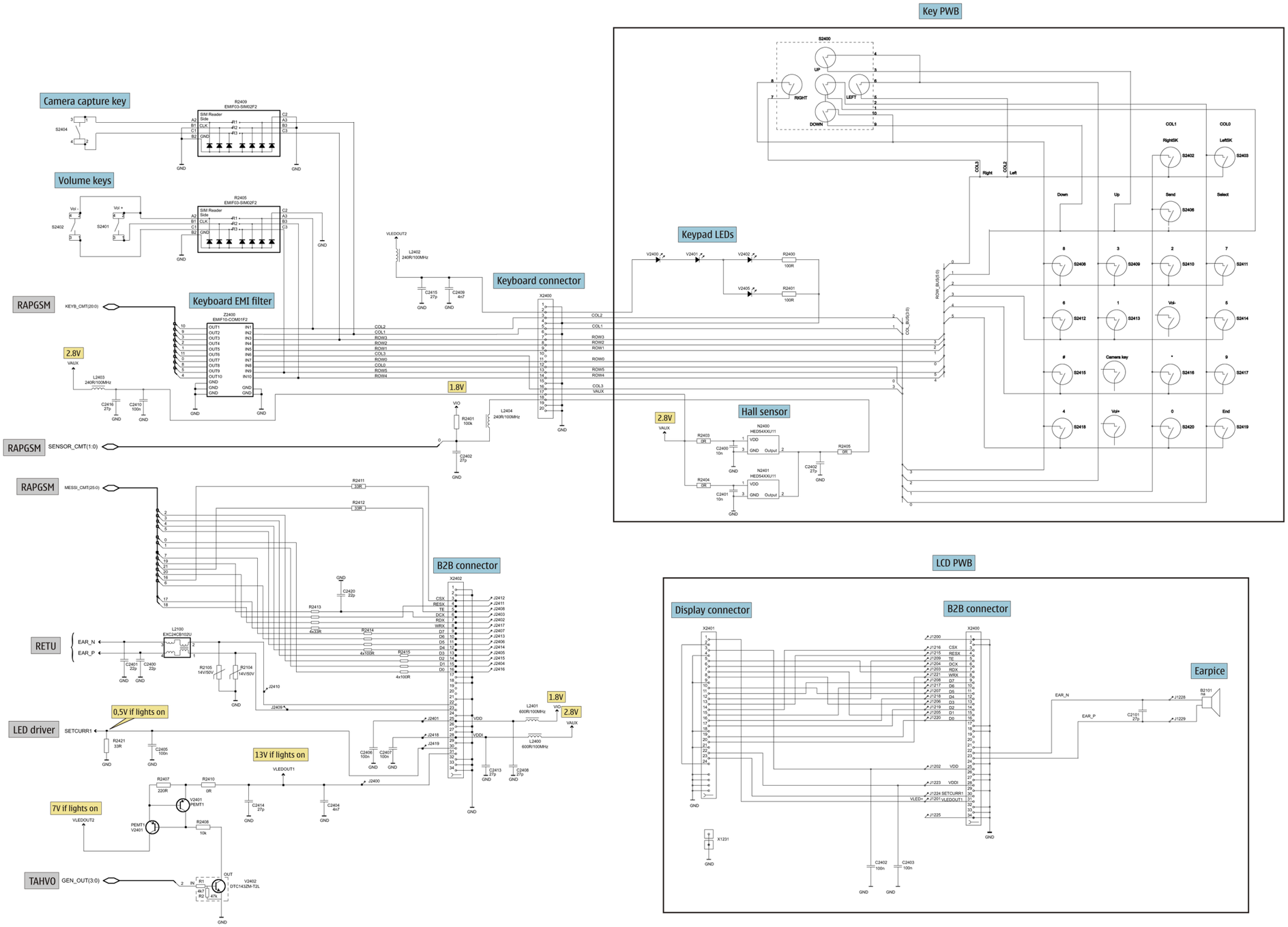
UI, Key PWB, LCD PWB, Earpiece



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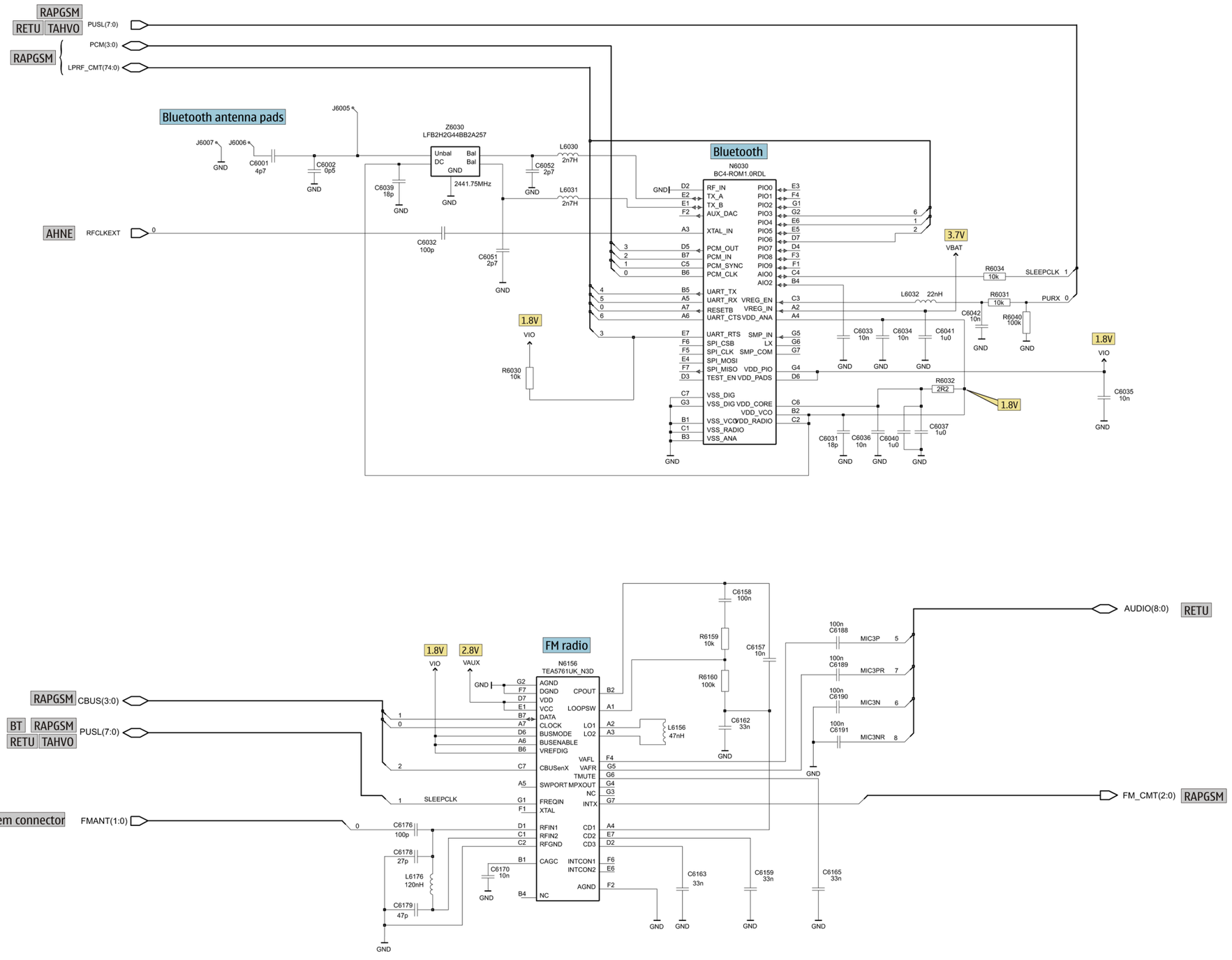
Bluetooth, FM radio



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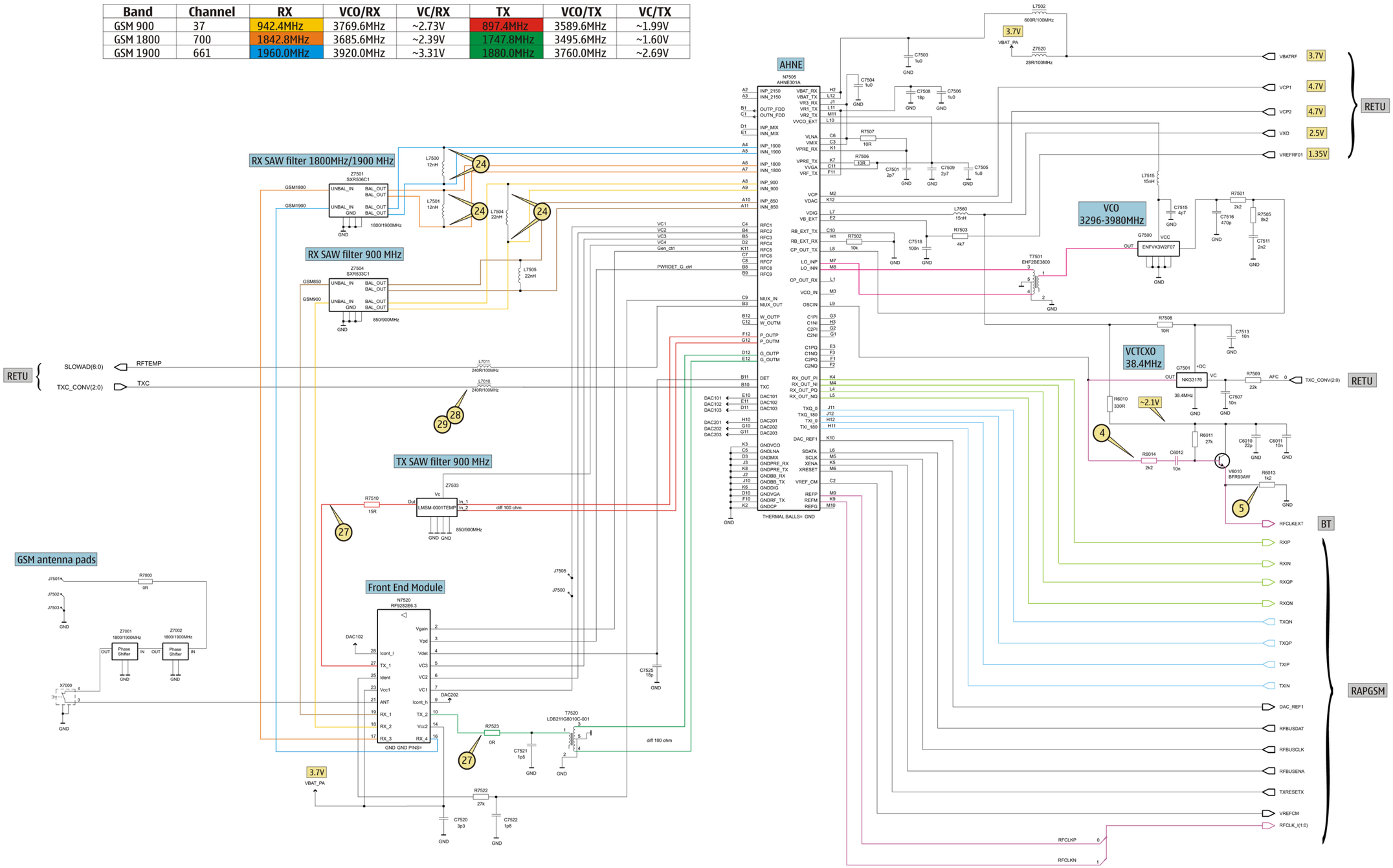
RF part, Bluetooth clock buffer

Band	Channel	RX	VCO/RX	VC/RX	TX	VCO/TX	VC/TX
GSM 900	37	942.4MHz	3769.6MHz	~2.73V	897.4MHz	3589.6MHz	~1.99V
GSM 1800	700	1842.8MHz	3685.6MHz	~2.39V	1747.8MHz	3495.6MHz	~1.60V
GSM 1900	661	1960.0MHz	3920.0MHz	~3.31V	1880.0MHz	3760.0MHz	~2.69V



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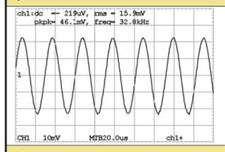
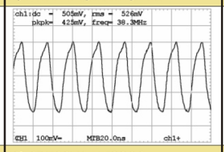
Signal overview

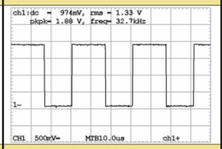
1) 32 kHz at C2209



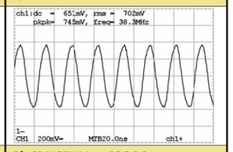
2) RFCLK at J2851-J2852



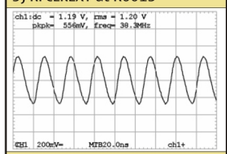
3) SLEEPCLK at J2217



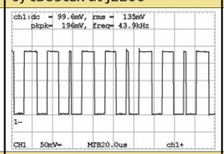
4) VCTCXO 38.4MHz at R6014



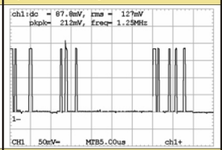
5) RFCLKEXT at R6013



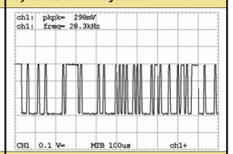
6) CBUSCLK at J2206



7) CBUSDA at J2207

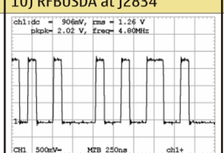


8) CBUSENX at J2209

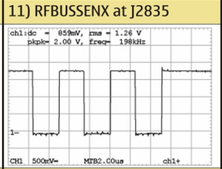


9) RFBUSCLK at J2833

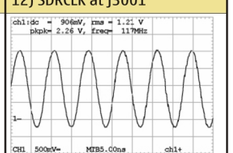
10) RFBUSDA at J2834



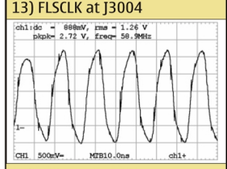
11) RFBUSSENX at J2835



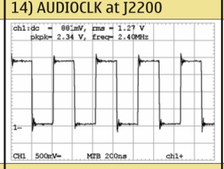
12) SDRCLK at J3001



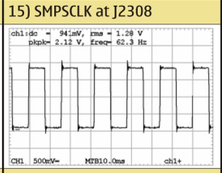
13) FLSCLK at J3004



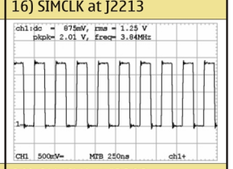
14) AUDIOCLK at J2200



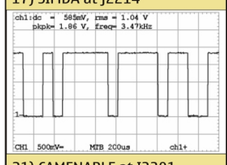
15) SMPSCLK at J2308



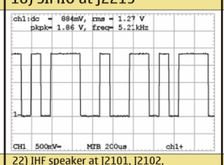
16) SIMCLK at J2213



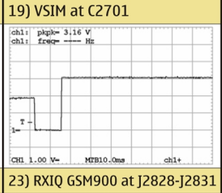
17) SIMDA at J2214



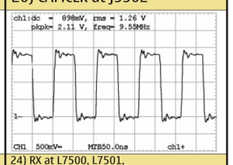
18) SIMIO at J2215



19) VSIM at C2701

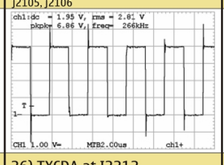


20) CAMCLK at J3302

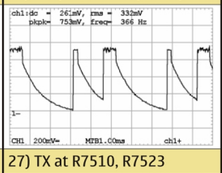


21) CAMENABLE at J3301

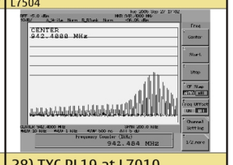
22) IHF speaker at J2101, J2102, J2105, J2106



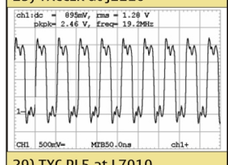
23) RXIQ GSM900 at J2828-J2831



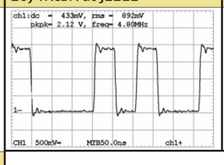
24) RX at L7500, L7501, L7504



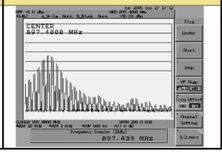
25) TXCCLK at J2210



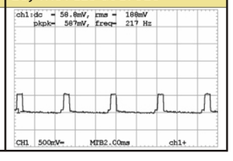
26) TXCDA at J2212



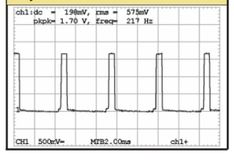
27) TX at R7510, R7523

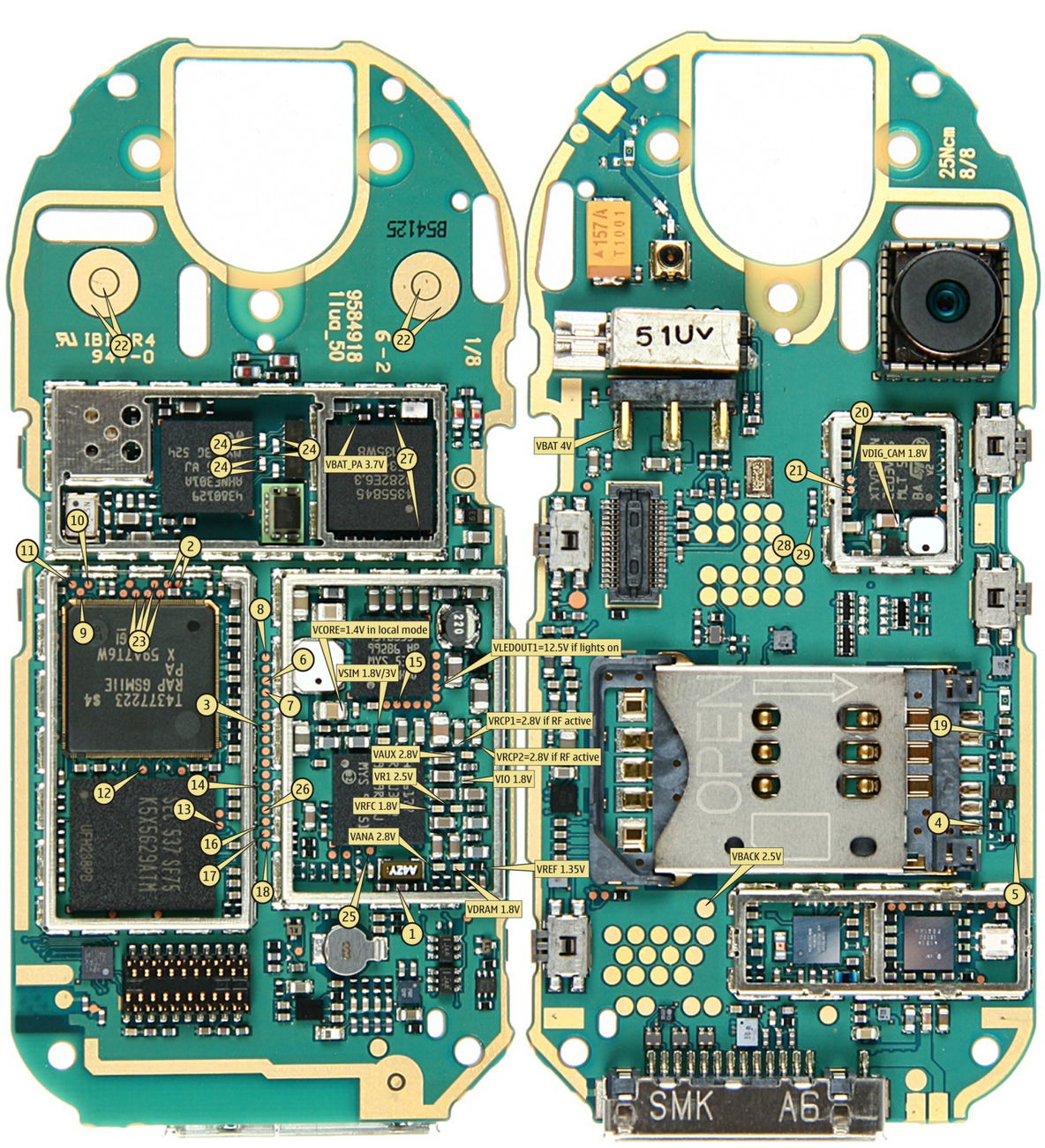


28) TXC PL19 at L7010



29) TXC PL5 at L7010





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Component finder (Engine module)

B		C2210	L8	C2807	J5	C7501	G4	J2218	K5	J6006	P2	N2300	K7	R2415	K4	X2700	M5
B2200	N7	C2211	L8	C2808	J5	C7503	I3	J2219	L5	J6007	P2	N2301	K9	R2417	P6	X3300	F3
C		C2212	L7	C2809	K5	C7504	G4	J2220	M5	J7500	H8	N3300	I4	R2421	K8	X7000	E7
C2000	P4	C2213	M8	C2810	L5	C7505	H3	J2221	M5	J7501	C8	N6030	O3	R2700	K5	Z	
C2001	P4	C2214	M8	C2811	M2	C7506	I3	J2222	O6	J7502	C8	N6156	O5	R2701	L2	Z2000	Q5
C2002	P6	C2215	M8	C2812	K5	C7507	I3	J2300	L7	J7503	B8	N7505	H4	R2801	K5	Z2001	Q6
C2003	P6	C2216	L8	C2813	J2	C7508	I4	J2306	F7	J7505	H8	N7520	H7	R2803	L5	Z2003	Q5
C2004	P6	C2217	N8	C2814	J5	C7509	H3	J2307	F6	L		R		R2804	L5	Z2400	O3
C2005	P6	C2219	N8	C2815	L5	C7510	I7	J2308	L7	L2000	P3	R2000	P5	R3000	M2	Z6030	Q2
C2006	P6	C2220	L7	C2816	M5	C7511	H3	J2309	K8	L2001	Q6	R2001	P6	R3002	K5	Z7501	G6
C2007	P7	C2221	L9	C2818	M3	C7513	I3	J2310	K8	L2002	Q7	R2002	P7	R3300	H3	Z7503	I6
C2008	P7	C2222	L8	C2819	M4	C7515	G3	J2311	L8	L2003	Q7	R2003	P7	R3301	H3	Z7504	H6
C2009	P7	C2223	L6	C2820	J3	C7516	H3	J2312	K8	L2004	Q6	R2004	P7	R3304	I4	Z7520	G6
C2010	P7	C2224	N6	C2821	J3	C7518	I4	J2313	L8	L2100	K6	R2005	P7	R3306	H3	Z7581	D7
C2011	P7	C2225	N8	C3000	N2	C7520	G7	J2314	K8	L2102	F6	R2006	P7	R3307	H3	Z7582	D7
C2012	P7	C2226	M8	C3001	N2	C7521	G7	J2315	K8	L2103	F5	R2007	Q6	R3312	O5		
C2013	P7	C2227	L7	C3002	N2	C7522	I7	J2316	L7	L2104	K9	R2008	P6	R3313	O5		
C2014	P7	C2228	M8	C3003	M5	C7524	I6	J2400	I6	L2105	K9	R2009	P6	R3314	M2		
C2015	P6	C2229	L7	C3004	M5	C7525	I8	J2401	I6	L2106	L9	R2010	P5	R6010	L2		
C2016	P5	C2230	N8	C3005	N5	D		J2402	I6	L2107	L8	R2012	O8	R6011	M2		
C2017	Q4	C2231	L6	C3006	N5	D2200	M7	J2403	J5	L2108	G8	R2013	O8	R6012	N2		
C2018	P5	C2232	L8	C3007	N5	D2800	K3	J2404	J6	L2109	G9	R2014	P8	R6013	N2		
C2019	P6	C2273	L6	C3008	M5	D3000	N3	J2405	J5	L2111	L9	R2015	O8	R6014	N2		
C2020	O7	C2274	L7	C3009	N5	D3300	H4	J2406	J6	L2112	G6	R2016	P8	R6030	P4		
C2070	E8	C2275	L6	C3300	I4	F		J2407	J5	L2113	G6	R2017	O8	R6031	O2		
C2071	H7	C2281	M8	C3301	H4	F2000	P3	J2408	I6	L2202	M9	R2018	P8	R6032	O4		
C2073	H8	C2300	J6	C3302	G4	G		J2409	J6	L2203	M9	R2019	O8	R6034	P2		
C2074	G8	C2301	J6	C3303	I4	G2200	O6	J2410	J6	L2204	N8	R2070	H6	R6040	O2		
C2075	H7	C2302	L6	C3304	H4	G7500	G3	J2411	J5	L2205	N9	R2100	P7	R6159	P6		
C2076	H7	C2303	J8	C3305	I4	G7501	I2	J2413	J5	L2206	M8	R2101	Q8	R6160	P6		
C2077	H6	C2304	L7	C3306	I4	J		J2414	J6	L2272	L7	R2102	O7	R7000	C8		
C2078	E8	C2305	J9	C3307	I4	J2000	Q3	J2415	J5	L2273	L6	R2103	O7	R7501	H3		
C2079	H8	C2306	I9	C3309	H4	J2001	P7	J2416	J6	L2301	J6	R2104	K6	R7502	G4		
C2100	P8	C2307	J7	C3310	I4	J2003	P6	J2417	I5	L2302	K6	R2105	J6	R7503	I4		
C2101	P7	C2309	J6	C6002	P3	J2004	P8	J2418	I6	L2304	J8	R2106	G6	R7504	H3		
C2102	P8	C2312	J7	C6010	M2	J2005	P5	J2419	I6	L2305	J8	R2107	G5	R7505	H3		
C2103	O7	C2313	J7	C6011	L2	J2006	P7	J2420	J8	L2306	I8	R2114	G8	R7506	H4		
C2104	O7	C2314	K8	C6012	M2	J2010	R3	J2803	K2	L2400	H6	R2115	G9	R7507	G4		
C2105	H6	C2315	K9	C6031	O2	J2011	O6	J2804	K2	L2401	H6	R2200	N9	R7508	H3		
C2106	G6	C2400	K7	C6032	P4	J2060	O7	J2828	J4	L2402	Q4	R2201	N8	R7509	I3		
C2107	G8	C2401	J7	C6033	P3	J2100	O8	J2829	J4	L2403	Q5	R2202	M6	R7510	G5		
C2108	K9	C2402	P5	C6034	P3	J2101	E3	J2830	J3	L2404	O5	R2203	N6	R7511	I5		
C2109	K9	C2403	J8	C6035	O3	J2102	E3	J2831	J3	L3301	H4	R2204	N6	R7522	I7		
C2110	K9	C2404	I7	C6036	O4	J2103	Q7	J2833	J2	L3303	I3	R2205	N6	R7523	G7		
C2111	F5	C2405	I7	C6037	O4	J2104	Q7	J2834	J3	L6001	P3	R2206	N6	S			
C2112	K8	C2406	I7	C6039	P3	J2105	E8	J2835	J2	L6030	O3	R2207	N6	S2401	H2		
C2113	K9	C2407	I7	C6040	O4	J2106	E8	J2851	J4	L6031	O3	R2208	N6	S2402	J2		
C2114	K9	C2408	H7	C6041	P3	J2107	O8	J2852	J4	L6032	O3	R2209	N6	S2403	I9		
C2117	N9	C2409	Q3	C6042	O3	J2108	O8	J3000	O4	L6156	O5	R2212	M6	S2404	O9		
C2118	M9	C2410	Q4	C6051	O3	J2200	M5	J3001	M3	L6176	P4	R2213	N8	T			
C2119	N9	C2413	H6	C6052	P3	J2201	L5	J3002	L2	L7010	I5	R2214	N8	T7501	H2		
C2120	N9	C2414	I7	C6157	O6	J2202	L5	J3003	O3	L7011	I5	R2216	N8	T7520	G8		
C2124	L9	C2415	Q4	C6158	O6	J2203	L5	J3004	M5	L7500	H5	R2307	H8	V			
C2126	L9	C2416	Q5	C6159	O4	J2204	N6	J3005	M5	L7501	H5	R2401	O5	V2000	P4		
C2127	M9	C2418	K3	C6162	O6	J2205	N7	J3006	M4	L7502	I4	R2404	J9	V2001	O6		
C2200	M6	C2419	J3	C6163	P5	J2206	K5	J3112	O6	L7503	I7	R2405	K2	V2302	I8		
C2201	M8	C2420	J4	C6165	O4	J2207	K5	J3113	P7	L7504	H5	R2406	J9	V2401	P9		
C2202	N9	C2700	L2	C6170	P5	J2209	K5	J3114	P8	L7505	H5	R2407	P9	V2402	O9		
C2203	N7	C2701	L2	C6176	P4	J2210	N7	J3115	O7	L7515	G3	R2408	P9	V6010	M2		
C2204	N7	C2800	L5	C6178	P5	J2212	M5	J3116	P7	M		R2409	N9	X			
C2205	N6	C2801	J4	C6179	P5	J2213	M5	J3117	P7	M2100	F7	R2410	J8	X2001	Q6		
C2206	N7	C2802	K5	C6188	O4	J2214	N5	J3300	I3	N		R2411	J3	X2060	H6		
C2207	N8	C2803	L5	C6189	O4	J2215	N5	J3301	H4	N2000	O8	R2412	J3	X2070	G7		
C2208	N7	C2804	J5	C6190	O6	J2216	L5	J3302	H4	N2001	P8	R2413	J3	X2400	P4		
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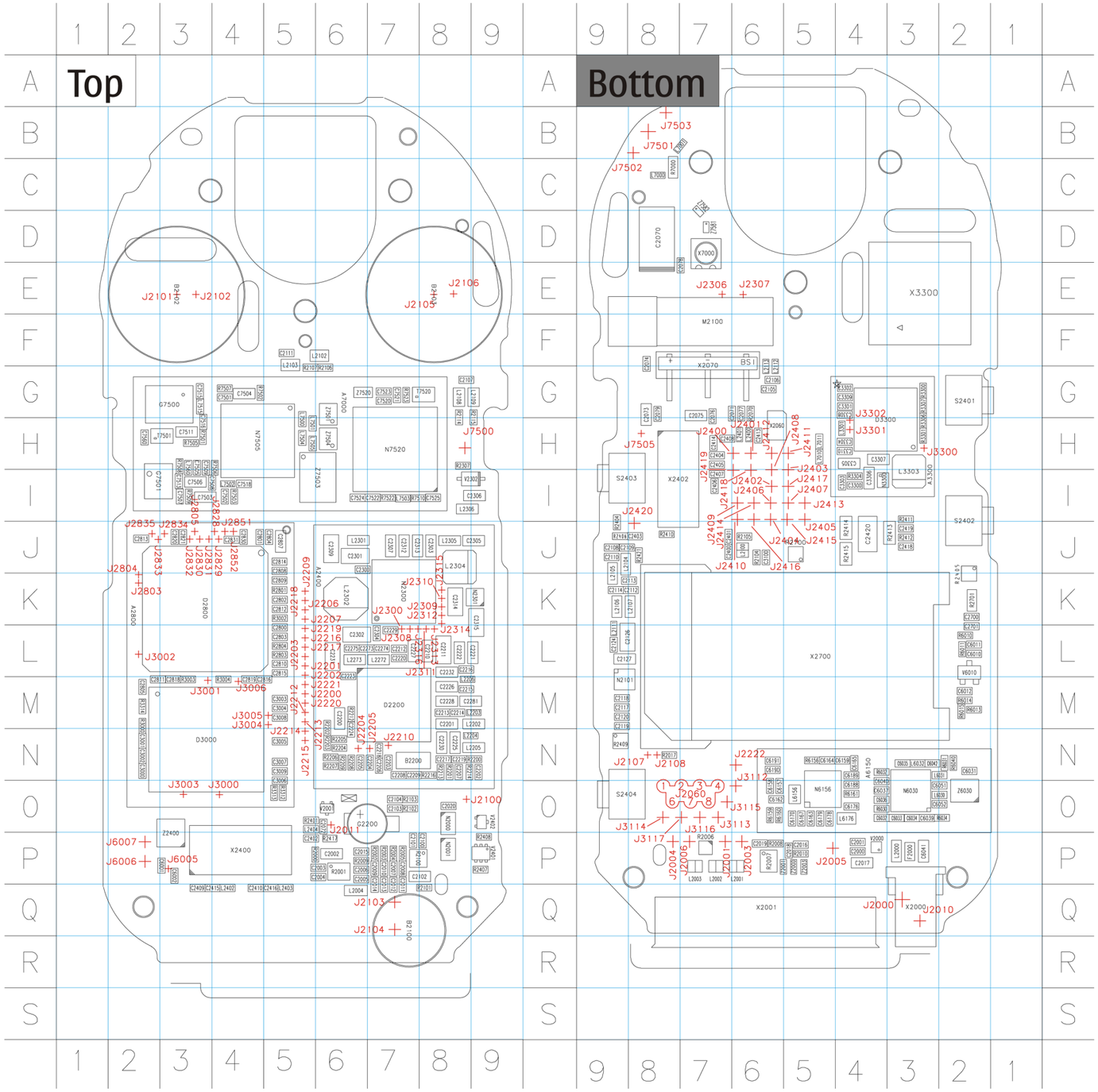

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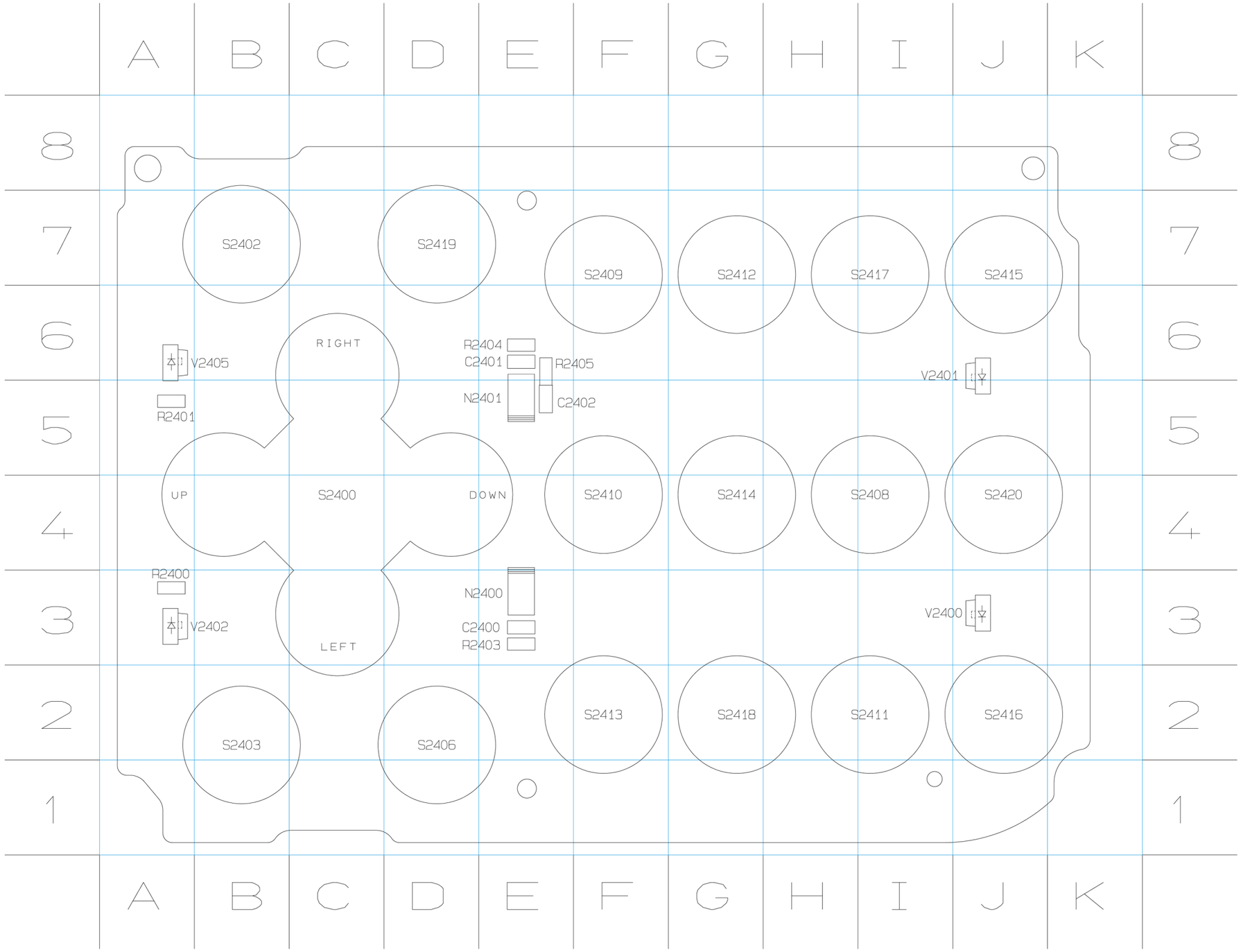
Component finder (Key PWB)

V	
V2400	J3
V2401	J6
V2402	A3
V2405	A6
N	
N2400	E3
N2401	E5
C	
C2400	E3
C2401	E6
C2402	E5
R	
R2400	A3
R2401	A5
R2403	E3
R2404	E6
R2405	E6



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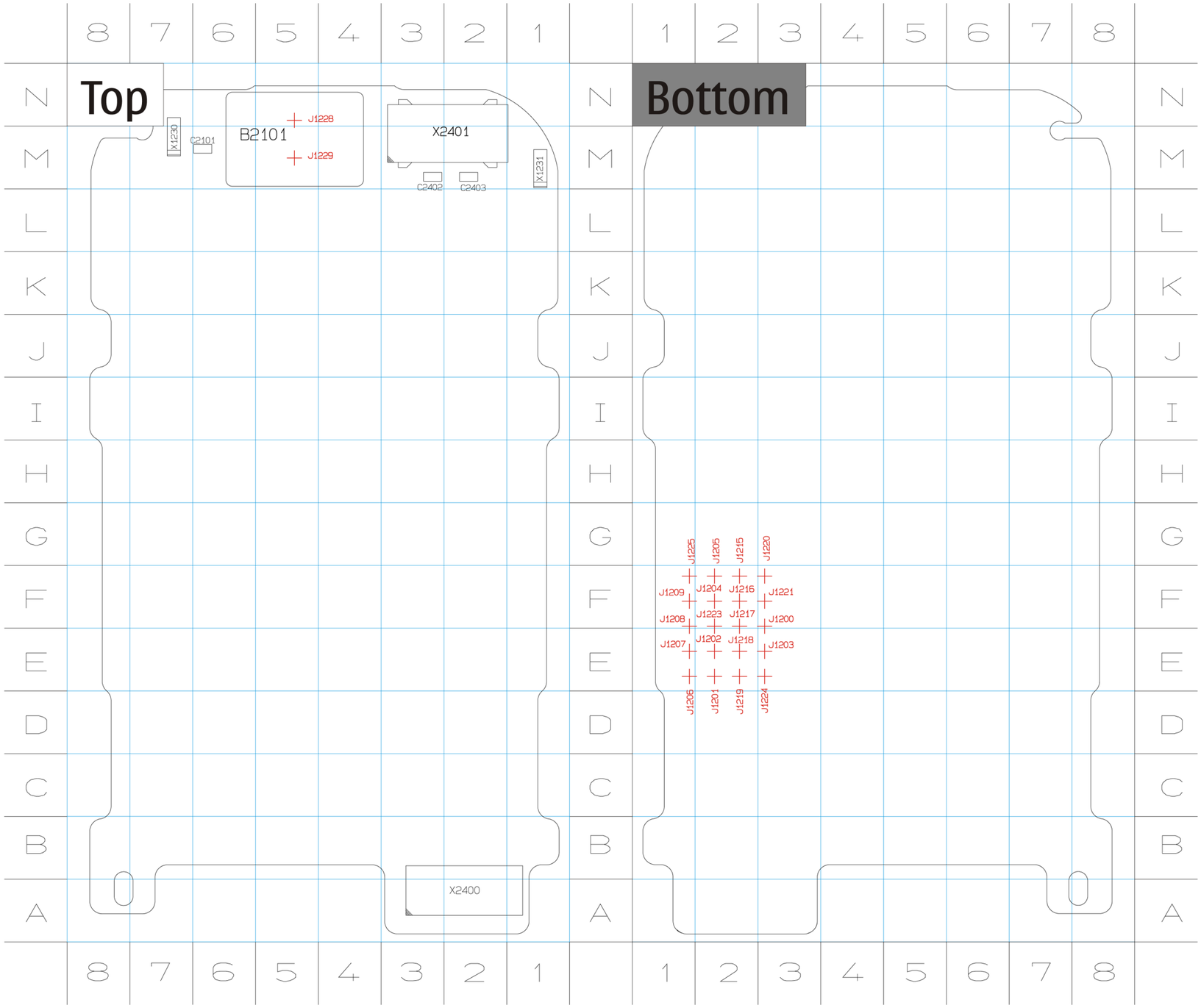
Component finder (LCD PWB)

B	
B2101	M5
C	
C2101	M6
C2402	M3
C2403	M2
J	
J1200	F3
J1201	E2
J1202	E2
J1203	E3
J1204	F2
J1205	F2
J1206	E1
J1207	E1
J1208	F1
J1209	F1
J1215	F2
J1216	F2
J1217	F2
J1218	E2
J1219	E2
J1220	F3
J1221	F3
J1223	F2
J1224	E3
J1225	F1
J1228	N5
J1229	M5
X	
X1230	M7
X1231	M1
X2400	A2
X2401	M2



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Glossary

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A/D-converter	Analog-to-digital converter
ACI	Accessory Control Interface
ADC	Analog-to-digital converter
ADSP	Application DPS (expected to run high level tasks)
AGC	Automatic gain control (maintains volume)
ALS	Ambient light sensor
AMSL	After Market Service Leader
ARM	Advanced RISC Machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Interface Protector
B2B	Board to board, connector between PWB and UI board
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic ,type of filter function)
BSI	Battery Size Indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP_WD2,UEME and Zocus
CCP	Compact Camera Port
CDSP	Cellular DSP (expected to run at low levels)
CLDC	Connected limited device configuration
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on Foil
COG	Chip on Glass
CPU	Central Processing Unit
CSR	cambridge silicon radio
CSTN	Color Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analouge converter
DAC	Digital-to-analouge converter
DBI	Digital Battery Interface
DBus	DSP controlled serial bus connected between UPP_WD2 and Helgo
DCT-4	Digital Core Technology
DMA	Direct memory access
DP	Data Package

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DPLL	Digital Phase Locked Loop
DSP	Digital Signal Processor
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evaluation
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compability
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FCI	Functional cover interface
FPS	Flash Programming Tool
FR	Full rate
FSTN	Film compensated super twisted nematic
GND	Ground, conductive mass
GPIB	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HF	Hands free
HFCM	Handsfree Common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHAR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity
IR	Infrared
IrDA	Infrared Data Associasion
ISA	Intelligent software architecture
JPEG/JPG	Joint Photographic Experts Group
LCD	Liquid Crystal Display
LDO	Low Drop Out
LED	Light-emitting diode

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LPRF	Low Power Radio Frequency
MCU	Micro Controller Unit (microprocessor)
MCU	Multiport control unit
MIC, mic	Microphone
MIDP	Mobile Information Device Profile
MIN	Mobile identification number
MIPS	Million instructions per second
MMC	Multimedia card
MMS	Multimedia messaging service
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architechture
OMAP	Operations, maintenance, and administartion part
Opamp	Operational Amplifier
PA	Power amplifier
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	Software tool of DCT4.x
PIM	Personal Information Management
PLL	Phase locked loop
PM	(Phone) Permanent memory
PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed Wiring Board
PWM	Pulse width modulation
RC-filter	Resistance-Capacitance filter
RF	Radio Frequency
RF PopPort TM	Reduced function PopPortTM interface
RFBUS	Serial control Bus For RF
RSK	Right Soft Key
RS-MMC	Reduced size Multi Media Card
RSSI	Receiving signal strength indicator
RST	Reset Switch
RTC	Real Time Clock (provides date and time)
RX	Radio Receiver

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SARAM	Single Access RAM
SAW filter	Surface Acoustic Wave filter
SDRAM	Synchronous Dynamic Random Access Memory
SID	Security ID
SIM	Subscriber Identity Module
SMPS	Switched Mode Power Supply
SNR	Signal-to-noice ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP, Official Tiku3G
TX	Radio Transmitter
UART	Universal asynchronous receiver/transmitter
UEME	Universal Energy Management chip (Enhanced version)
UEMEK	See UEME
UI	User Interface
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC
USB	Universal Serial Bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VCXO	Voltage Controlled Crystal Oscillator
Vp-p	Peak-to-peak voltage
VSIM	SIM voltage
WAP	Wireless application protocol
WD	Watchdog
XHTML	Extensible hypertext markup language
Zocus	Current sensor, (used to monitor the current flow to and from the battery)

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